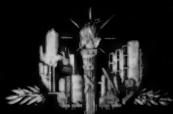


# *Chemical Engineering*



## **HYDROGEN'S REVOLUTIONARY ROLE**

**1959  
AWARD  
WINNER**



TEXACO

**TEXACO'S SYNTHESIS GAS PROCESS**

**27th Exposition of Chemical Industries — Your Preview and Guide, page 281**

**EIMCO***design and production***PROGRESS REPORT**

B-398

*Filter Division of The Eimco Corporation, Box 300, Salt Lake City 10, Utah*

## **EimcoBelt Filter Saves \$200,000 First Year, in Recovery Operation !**

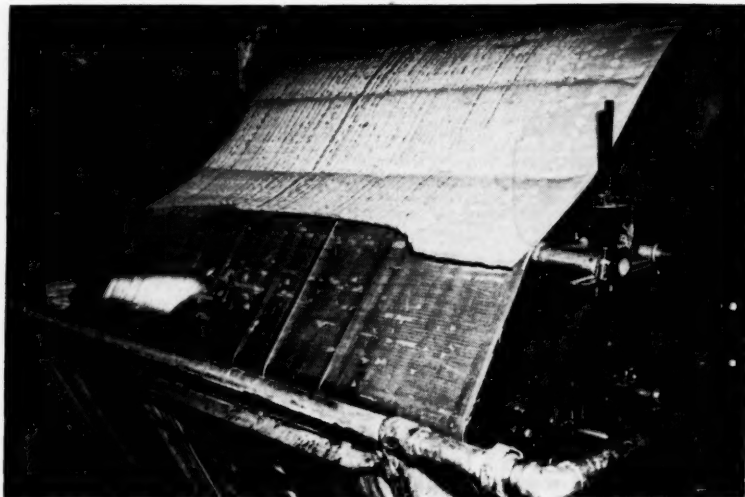
In a classified chemical operation, gypsum was being recovered by thickening and countercurrent washing on two stages of vacuum filtration.

With standard drum filters, filtration of gypsum was troublesome. Excessive blinding of cloth filter media resulted in hundreds of pounds of valuable product being lost every day.

When an EimcoBelt filter replaced the standard drum for the first filtration stage in this operation, it immediately overcame all filtering difficulties — because of its' ability to maintain a continuously clean medium.

The EimcoBelt, with its' unique new operating principle, removes the filter medium from the drum every cycle . . . discharges the cake over a small diameter discharge roller . . . washes the medium with jet sprays . . . always returns a clean medium to the drum.

Soluble losses were reduced to less than one-third the average



6-ft. diameter by 6-ft. face EimcoBelt filter installed for gypsum recovery.

losses with the two conventional drum filters — resulting in savings of over \$200,000 a year for this company!

Moreover, it soon became apparent that the new filter could handle the filtration load formerly handled by the two drum filters. Accordingly, the second stage drum filter was eliminated from the flowsheet.



**SEND FOR  
EIMCOBELT  
Bulletin F-2053**

Write the Eimco Corporation,  
Box 300, Salt Lake City 10,  
Utah, for your copy

## **Eimco-Process Equipment Selected for Acid Neutralization and Scrubber Effluent Clarification at Aluminum Plant**

Need for a positive system to neutralize and clarify a fluorine-bearing effluent prompted the operators of an aluminum reduction process to contact Eimco-Process Engineers. Close work with the company engineers in a test program led to the development of an ingenious flowsheet and custom-adaptation of Eimco-Process equipment to the system requirements.

Careful planning, designing and fabricating, plus conscientious field services, has resulted in a dependable, economical system that gives its user maximum returns

from every invested dollar.

In treating the hydrofluoric acid waste, effluent from scrubbing towers passes through three stages of neutralization in Eimco-Process Contactors, followed by clarification in a Type CM Eimco-Process Reactor-Clarifier. The clarifier overflow has a turbidity of 10 ppm or less and is returned to the scrubber water system for re-use.

Other Eimco-Process equipment in this treatment plant includes lime feeders, lime slakers and coagulant mixers and feeders.

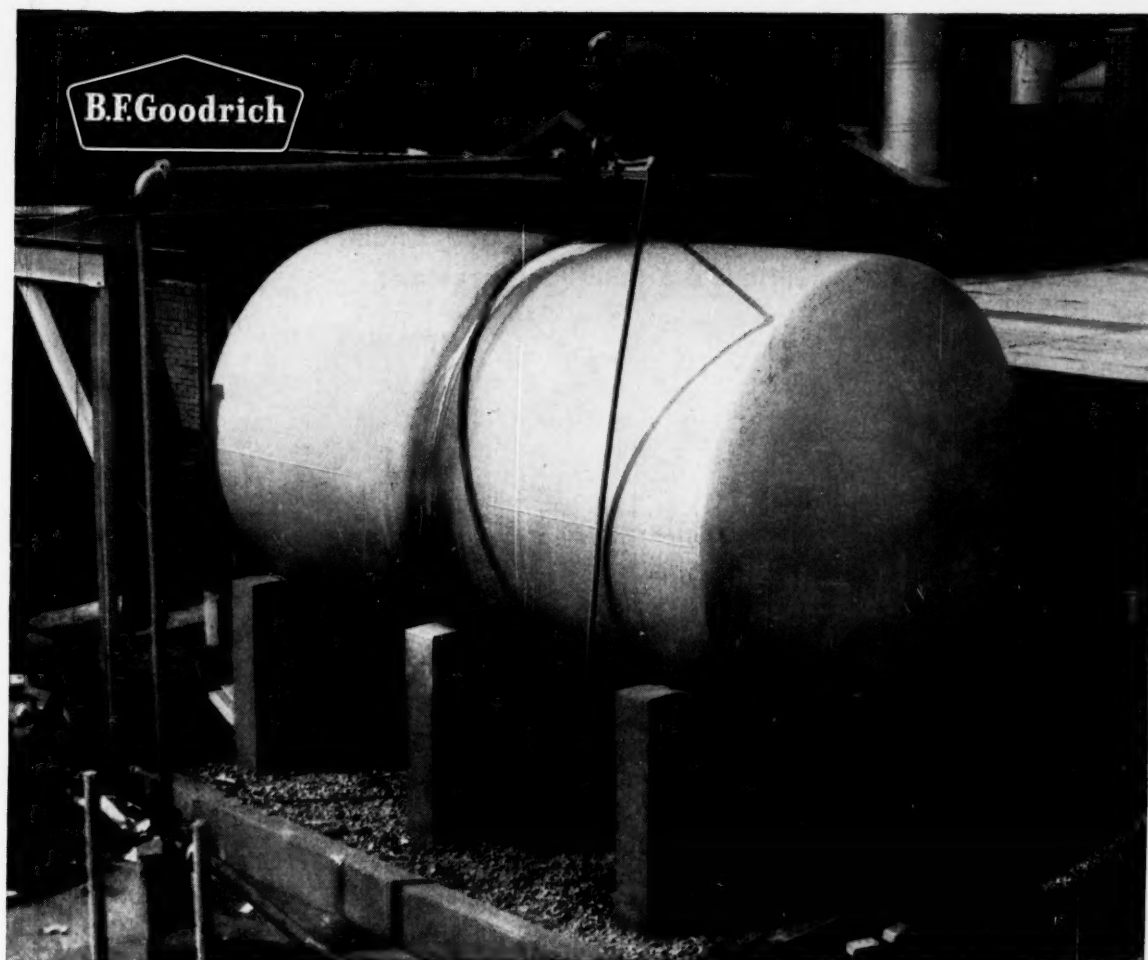


Aluminum processor gets high separation efficiency with this Eimco-Process Reactor-Clarifier.

**Process Engineers Division  
THE EIMCO CORPORATION**

420 Peninsular Ave., San Mateo, Calif.





## How Koroseal saves \$12,000 a year for L. A. Darling Company

**T**HE L. A. Darling Company of Bronson, Michigan manufactures plated racks and other display equipment for retail stores. Manual handling of muriatic acid in carboys (glass containers) was an expensive part of the manufacturing cost.

Then, three years ago, Darling installed a 12,000-gallon Koroseal-lined tank (pictured above) and a network of rigid Koroseal PVC piping. The tank permitted bulk purchase of acid, and the piping eliminated manual handling. Tangible savings have been in excess of \$12,000 each year. And further sav-

ings have been realized through the elimination of broken carboys and the release of working capital previously tied up in deposits on carboys.

Koroseal rigid PVC by B.F. Goodrich has answered countless problems for alert manufacturers. Koroseal is unaffected by most alkalis and acids and is completely inert in the presence of oil, alcohol and salt solutions. It resists corrosion, has superior insulation qualities, will not support combustion and never needs to be painted.

Easy to install, Koroseal in various forms can be threaded, cut, welded

or drilled. It is available in pipe, tubes, rods, valves and sheets. For information, just send in the coupon.

**B.F. Goodrich Industrial Products Co.**  
Dept. CE-11, Marietta, Ohio

Please send me free booklets on:

- ☐ Rigid Koroseal Pipe  
☐ Rigid Koroseal Sheet

Name

Company

City  Zone  State

Koroseal—T. M. Reg. U. S. Pat. Off.

# B.F. Goodrich *Koroseal rigid PVC products*

# WHAT'S NEW? WHAT'S BEST FOR YOU? in SOLID-LIQUID SEPARATING METHODS and EQUIPMENT

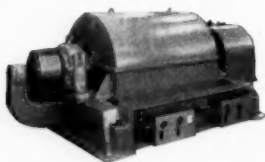
Find out at the Bird Machine Booth 685, Chemical Exposition  
Here's a thumbnail preview:



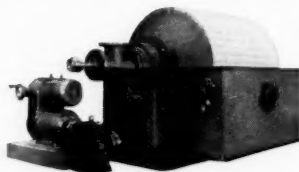
**NEW** — Six-inch, High Speed Bird Continuous Solid Bowl Centrifuge for thoroughly effective low cost separations involving moderate volumes or limited space or separating forces produced by speeds up to 6,000 rpm. Ideal for experimental and development work, too.



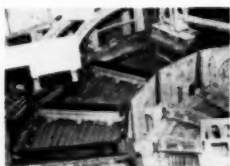
**NEW** — Bird-Humboldt Oscillating Screen Centrifuge for dewatering plus 65 mesh granules or crystals at rates from 5 to 50 or more tons per hour. Gets the solids down to 5% or less surface moisture with almost no loss or degradation of solids. Operates up to 3000 hours or more without screen replacement. Takes only 0.2 KWH per ton of dried solids.



**Bird Continuous Solid Bowl Centrifugals** in sizes up to 54" x 70" bowl and in designs to fit a great range of process requirements. These fast, clean, rugged, dependable units handle thick or thin, hot or cold slurries in large or small volumes. Solids may range from a fraction of a micron to half inch. Cost of operation and maintenance averages only a few cents per ton.



**Bird-Young Rotary Vacuum Filters** provide several times the usual capacity per foot of filter area. Advantages include positive, complete discharge of well dried cakes; ability to handle large volumes of filtrate; efficient, multi-stage, counter-current wash; totally enclosed, fume-tight operation if desired; small space; low maintenance cost.



**Bird-Prayon Horizontal, Pan Type Vacuum Filters** assure maximum effective cake wash with minimum wash liquor; up to six counter-current washes, each kept sharply separate; high tonnage per unit of filter area which ranges from 30 to 560 sq. ft.



**Bird Suspended Batch Centrifuges** for heavy duty, high capacity operations; 40" or 48" basket, perforate or imperforate; fume-tight or explosion proof construction when needed.

**WHICH FOR YOU?** Bird engineers are backed by the Bird Research and Development Center, a fully staffed and equipped, pilot-scale test laboratory devoted exclusively to solid-liquid separations. Because of the comprehensive range of Bird equipment, recommendations are unbiased and based on *what's best for you.*

**BIRD MACHINE COMPANY • South Walpole, Mass.**

Regional Offices: Evanston, Illinois • Alamo, California • Atlanta, Georgia



November 16, 1959

# **Chemical Engineering**

Vol. 66, No. 23

CHEMICAL TECHNOLOGY FOR PROFIT-MINDED ENGINEERS

Wallace F. Traendly, Publisher  
Sidney D. Kirkpatrick, Editorial Director

Cecil H. Chilton, Editor-in-Chief

## **CHEMICAL ENGINEERING DEVELOPMENTS**

Editor: Calvin S. Cronan.  
Associate Editors: Donald R. Cannon, T. Peter Forbath.  
Assistant Editors: Frances Arne, John B. Bacon, John A. King,  
Roland A. Labine, Charles C. Van Soye.

**CHEMENTATOR** Top Chemical Developments and What They Mean, 87  
What's New and Significant in Research, 94

**PROCESSES & TECHNOLOGY** First Kilocurie Plant Now On Stream, 96  
Industry Steps Up Isotope Utilization, 100  
Isocracking Bids for the Gasoline Pool, 106

**CHEMICAL ECONOMICS** Epoxies: A Boom at Last?, 112

**NEW CHEMICAL PRODUCTS** Consumer Wraps Now Come in PVC, 116

**NEW PROCESS EQUIPMENT** New Equipment Developments, 122  
Equipment Cost Index, 239

**PROCESS FLOWSHEET** Drying Tricks Tailor Resin Properties, 166

## **CHEMICAL ENGINEERING PRACTICE**

Editor: Theodore R. Olive.  
Associate Editors: Raymond F. Fremed, Robert B. Norden.  
Assistant Editors: Peter J. Brennan, Steven Danatos, Martin D. Robbins,  
William C. Schall.

**15TH BIENNIAL AWARD** Partners in Man's Progress, Sidney D. Kirkpatrick, 175  
Hydrogen's Revolutionary Role, 178

**FEATURE ARTICLES** New Fiber Mist Eliminator, J. A. Brink, Jr., 183  
Importable Know-How—3 British Papers, 187  
How to Estimate Liquid Densities, W. R. Gambill, 193  
Charts Size Composite Vessels, T. M. Simonian, 195\*

\* FREE—for your files—Check Reader Service postcard (p. 247) for an extra file copy of this guide to picking two-shell vessels.

Contents continued . . . turn page

*Complete*  
**GENERAL  
PLATE**

*Platinum Group  
Metal Service*

**Includes  
refining,  
alloying,  
fabrication**

**Platinum metal users can now  
take advantage of Metals & Controls'  
expanded facilities — one of the  
most modern and complete  
in the industry.**

**Get full information now ... write  
for free catalog, PR-800, which  
details platinum laboratory ware.  
No obligation.**



Here's how General Plate can serve you in platinum group metals. We are in a position to:

- ✓ Assay and refine platinum group metals.
- ✓ Recover and rework your scrap materials.
- ✓ Supply platinum group metal alloys.
- ✓ Produce electroplating solutions and chemical compounds for catalysts.
- ✓ Produce solid and composite platinum group metals in sheet — foil — wire — tubing — gauze.
- ✓ Fabricate electrical contacts and contact assemblies for magnetos, instruments and controls; produce laboratory ware, linings for vessels, thermocouple wire, and other parts — all to exacting customer's specifications.

## **METALS & CONTROLS**

611 FOREST STREET, ATTLEBORO, MASS., U. S. A.

**A DIVISION OF TEXAS INSTRUMENTS INCORPORATED**

**General Plate Products:** Clad Metals • Electrical Contacts • Truflex® Thermostat Metal • Platinum Metals • Reactor Metals • Radio Tube & Transistor Metals

Contents, continued

# Chemical Engineering

November 16, 1959

PRINT ORDER OF THIS ISSUE 49,806

CE COST FILE	Labor Factors; Electrical Circuits, <i>W. G. Clark</i> , 200
PROCESS DESIGN NOTEBOOK	Laboratory Dust Feeder Covers Wide Rate Range, <i>C. C. Shale</i> , 202
	Meterless Regulator for Gas, <i>T. J. Dixon</i> , 204
	Handling Exponents on Your Log-Log Rule, <i>M. R. Levy</i> , 204
YOU & YOUR JOB	Hoover Breaks Ground for Engineers, 206
OPERATION & MAINTENANCE	Equipment Reliability vs. Cost, <i>I. J. Karassik</i> , 210
CORROSION FORUM	Wood Gains Rating as "Noncombustible," 216
1959 CHEM SHOW	Highlights, Plans, Exhibitors, Products, 281
OTHER REGULAR FEATURES	Firms in the News, 223
	Convention Calendar, 230
	More New Equipment Developments, 232
	Technical Bookshelf, 240
	Letters: Pro & Con, 244
	Classified Section, 409
	Equipment Searchlight, 410
READER SERVICE	Reader Service Postcard, 247
	Reprints Now Available, 249
	Guide to Technical Literature, 250
	Advertisers in This Issue, 418

**Regional Editors:** Midwest (Chicago), John Winton; Western (San Francisco), Emil J. Mikity; Southwest (Houston), Thomas H. Arnold, Jr.; Washington, G. B. Bryant, Jr., Representatives in 73 cities, 60 foreign countries.

**Production & Presentation:** Lester B. Pope, Editor, Production & Copy. Margaret R. Wenk, Senior Art Director; Louis H. Default, Associate Art Director. Carol A. Richards, Editorial Makeup. Joan Nilsen, Reprint Operations.

**Advertising & Business:** J. Elton Tuohig, Advertising Sales Manager. Sales Representatives: see p. 418.  
Promotion Manager: Hugh T. Sharp. Market Research Manager: Jeanette Paschall. Reader Service: Ellen Flynn.  
Business Manager: Anton J. Mangold. Makeup: Grace Barrie.

**Circulation:** Paul W. Erb, Manager.

Chemical Engineering (with Chemical & Metallurgical Engineering) is published biweekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 39-129 North Broadway, Albany 1, N. Y.  
**Executive, Editorial, Circulation and Advertising Offices,** 330 West 42nd St., New York 36, N. Y.  
**Officers of the McGraw-Hill Publishing Co., Inc.:** Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice President; L. Keith Goodrich, Vice President and Treasurer; John J. Cooke, Secretary.  
**Officers of the Publications Division:** Nelson L. Bond, President; Harry L. Waddell, Senior Vice President; John R. Callahan, Vice President and Editorial Director; Joseph H. Allen, Vice President

and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Subscriptions are solicited from engineers and technical management in the Chemical Process Industries. **Position, company connection, and nature of company's business, products, and approximate number of employees, must be indicated on subscription application.** Subscription rates per year for individuals in the field of the publication: U. S. and Possessions \$3 (single copies 75¢); Canada \$4, other Western Hemisphere \$15, all others \$25. The Publisher, upon written request from any subscriber, agrees to refund the part of the subscription price applying to copies not yet mailed.

Second class postage paid at Albany, N. Y. Printed in U.S.A. Title registered in U.S. Patent Office. ©Copyrighted 1959 by McGraw-Hill Publishing Co., Inc. All rights reserved. Member A.B.P., ABC.

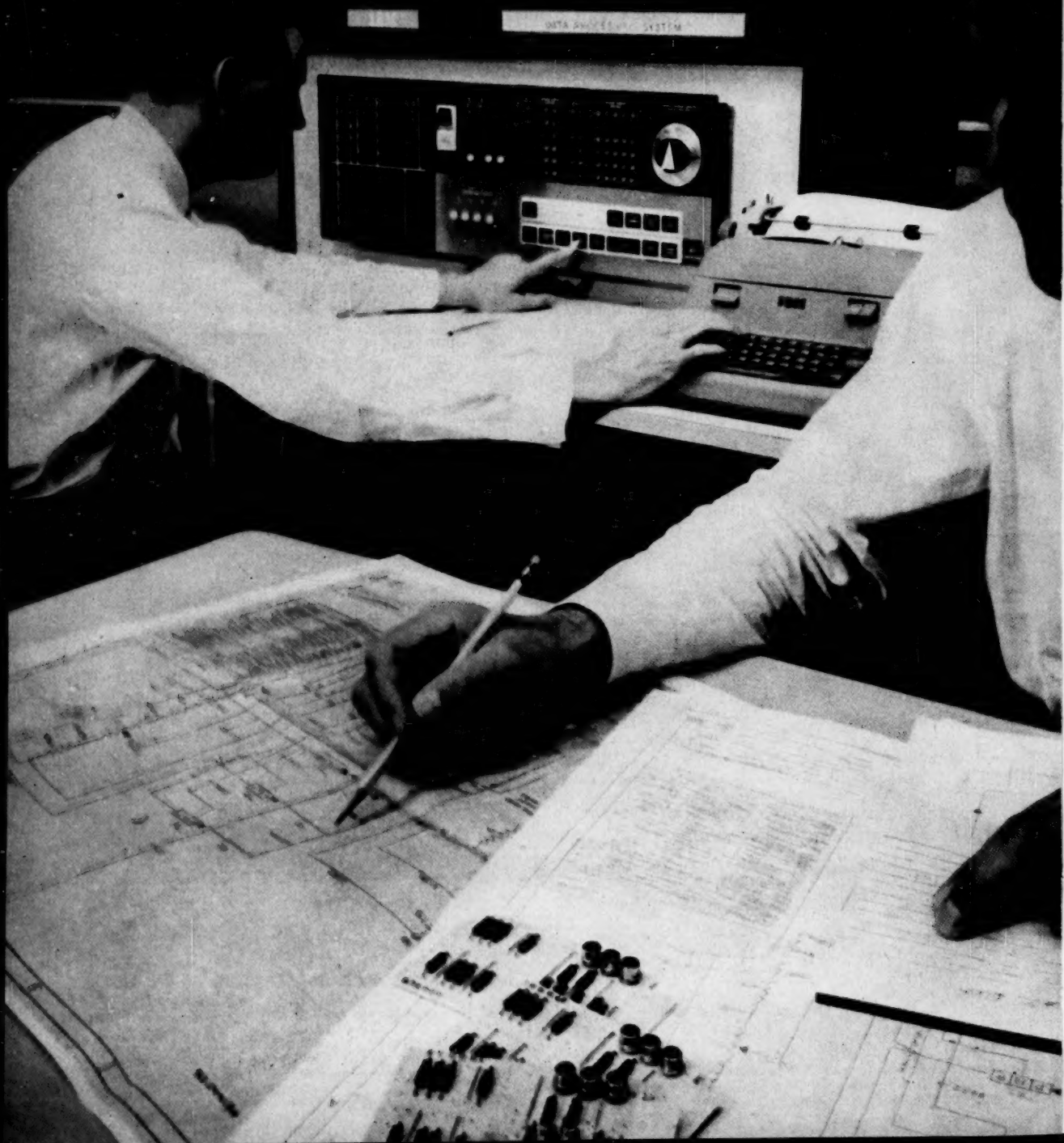
**Subscriptions:** Send correspondence and change of address to Fulfillment Manager, Chemical Engineering, 330 West 42nd Street, New York 36, N. Y. Send notice promptly for change of address, giving old as well as new address. Enclose an address label from a recent issue of the magazine if possible. Allow one month for change to become effective.

Postmaster: Please send form 3579 to Chemical Engineering, 330 W. 42nd St., New York 36, N. Y.



$$11 \left[ \frac{1}{2} \left( \frac{1}{2} + \frac{1}{2} \right) \right] \left( \frac{1}{2} + \frac{1}{2} \right)$$

$$\frac{1}{2} \left( \frac{1}{2} + \frac{1}{2} \right) = \frac{1}{2}$$



*announcing the new*  
**IBM 1620**

*first solid state  
engineering computer  
in the low-price field*

Here is a new and powerful stored program, desk-size computer designed to bring more computing ability to engineering problems at low cost.

Transistorized throughout, the IBM 1620 is the only solid state, core-storage computer in its price class.

Easy to learn—easy to operate—easy to communicate with—this powerful computer relieves engineers from routine calculations—frees them for creative tasks.

Data is fed into the 20,000-digit magnetic core memory of the 1620 via punched paper tape. Alpha-numeric output is printed at the console typewriter in desired format, under stored program control.

This new computer with its two-address instruction format and variable field length, gives you up to 50% more storage capacity than a fixed word-length system.

All notations of input and output are in the decimal system. An unlimited decimal field and internal self-checking assure accuracy. A powerful two-address instruction format adds to the 1620's timesaving capabilities.

Programming is simplified through the use of IBM Fortran—a mathematical programming system which compiles machine instructions from algebraic and English language notation. A library of programs for standard engineering computations will also be part of the 1620 package.

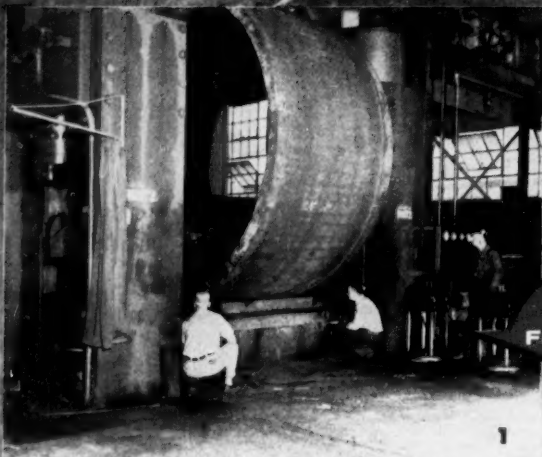
Call your IBM representative—ask him to show you all the unique features of the IBM 1620. Like all IBM data processing equipment, this system may be purchased or leased.



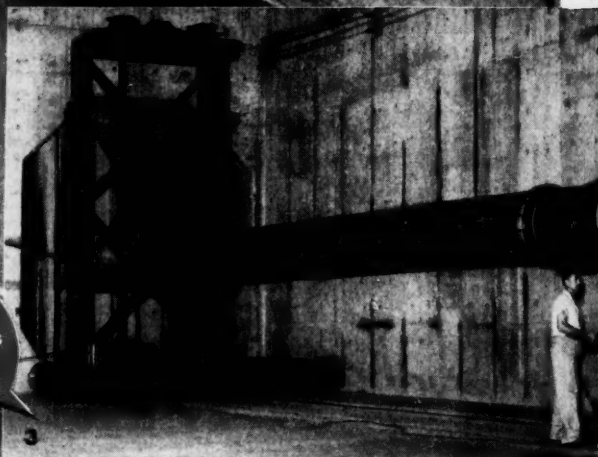
**BALANCED DATA PROCESSING**

**IBM®**

*Balanced Data Processing combines systems and services inseparably to produce performance in the best tradition of more than 45 years of IBM experience. It means more production per data processing dollar for you.*



1



3

2



This is

## CRAFTSMANSHIP IN STEEL

Precise engineering and EXPERIENCE mark **CB&I** Coordinated Services

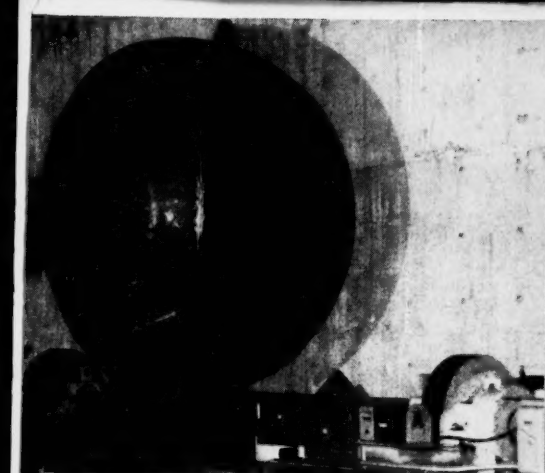
Almost 70 years of specialization in the design, engineering, fabrication and erection of steel plate structures will build long and efficient performance life into your next CB&I-built structure. *Here's why:*

**CB&I Engineers.** From first contact with the customer through final testing, CB&I's general engineering staff supplies technical guidance to the CB&I team. Important coordination between fabricating, erection and testing is thus insured.

**CB&I Fabricates.** The finest manufacturing facilities—including X-ray and stress relieving—backed by metallurgical techniques and testing facilities second to none—are maintained in four strategically located and fully equipped fabricating plants.

**CB&I Erects.** Skilled, responsible crews work with up-to-date equipment. Field X-ray and stress relieving equipment, in addition to CB&I-developed welding techniques, are an important part of their trade. Experience in a wide variety of metals, including stainless, nickel, aluminum and clad materials are also part of the service that has earned CB&I a *global* reputation for erecting on a *world-wide* basis.

These coordinated services are what you receive when you contract for a CB&I-built structure. CB&I customers have learned to expect and get top rated performance and maximum service life from *CB&I craftsmanship in steel*. Write our nearest office for details. Ask for the CB&I Bulletins on: *Special Plate Structures* and *CB&I Field Services*.



1 5-in. thick plate for reactor is fabricated at CB&I's Birmingham plant.

2 Workman smooths seams on an assembled section.

3 X-ray machine checks seam welds. Machines operating at 1,000,000 and 2,000,000 volts are used to completely inspect steel vessels as much as 10 inches thick.

4 72-ton top section for reactor-regenerator is lowered into position under supervision of CB&I erection specialist.

5 40S STAINLESS STEEL HORTONCLAD® coking chambers were fabricated and erected by CB&I for a Kansas refinery. Stainless is backed by A204 Grade A moly steel.

*Hortonclad®*, developed by CB&I, is a composite metal having an integral and continuous bond produced by a high vacuum bonding process. It is available only in CB&I fabricated tanks, pressure vessels and other clad structures.



Ad No. P72SCB-R

# CHICAGO BRIDGE & IRON COMPANY

332 SOUTH MICHIGAN AVENUE

CHICAGO 4, ILLINOIS

OFFICES AND SUBSIDIARIES IN PRINCIPAL CITIES THROUGHOUT THE WORLD



See our Exhibit at the "CHEM SHOW"—Booth 844





**Fred Wheelwright,**  
**Manager, Industrial Sales:**

"Two kinds of difficulties arise in the selection of process equipment. The *first* consideration, process efficiency, gives us no difficulty at De Laval. Well-documented performance specifications are reinforced with thorough pilot plant trials at De Laval laboratories when necessary. Each piece of De Laval process equipment is *known* to be capable of doing its job at time of sale.

"The *second* is the joint consideration of tight space availability, scarce manpower and budget.

Our success, too, in meeting the needs of space and manpower economy — and budget — is borne out by many thousands of installations.

It reflects a performance bonus from the design ingenuity of equipment just *naturally* built to perform with a maximum economy of space and manpower. Three examples are shown here."

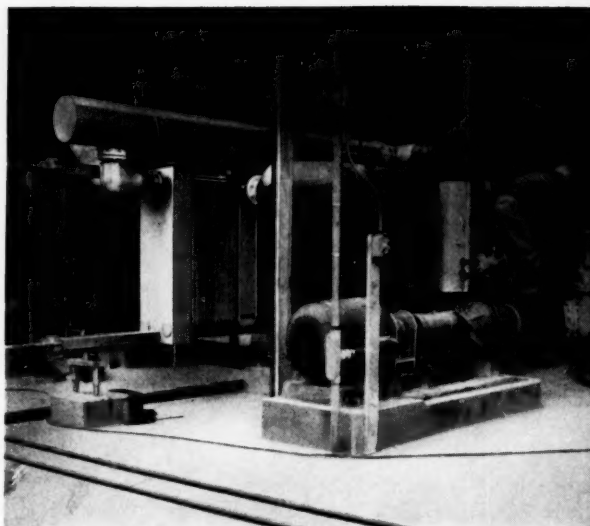
For further information, write to De Laval.



C-12

**THE DE LAVAL SEPARATOR COMPANY**  
Poughkeepsie, New York  
5724 N. Pulaski, Chicago 46, Illinois

**DE LAVAL PACIFIC COMPANY**  
201 E. Millbrae Avenue, Millbrae, California



## **THREE DIFFICULT MET BY**



### **Viscous liquid easily separated in pressurized centrifuge**

**Problem:** A viscous, high-melting-point rubber accelerator was to be separated from an alcoholic reaction mixture.

**Solution:** Centrifugal separation at liquefying temperatures. This also meant maintaining pressure to avoid alcohol boil-off. An open-system separation was not practical but tests at De Laval's pilot plant proved the Hermetic Cen-

trifuge could handle this job. In actual production, instantaneous and complete separation was easily achieved with a De Laval Hermetic Centrifuge to provide a clean product and no loss of the alcohol phase.

Similar separation problems involving elevated temperatures and pressures can be handled by the many standard types of De Laval Hermetics. Corrosion-resistant and easy to clean, these centrifuges meet all the requirements of industrial service. As in the case quoted here, our technical service in providing the *right* design for volume and purity requirements often includes pilot plant pre-testing before shipment. Please write for details.



## **Batch-process blow steam provides steady-source heat**

**Problem:** For a 15 or 20 minute period, the discharge of a pulp-digester autoclave produced "waste" steam totaling 255,000 pounds per hour. How to reclaim this heat without resorting to a large shell and tube heat exchanger?

**Solution:** The periodic blow steam was condensed by a small jet condenser dis-

charging into a hot water storage tank. Cycling this hot water through a compact De Laval Plate Heat Exchanger provided a continual heat source to raise the temperature of 409,000 pounds per hour of incoming process water from 110°F. to 160°F. Cooled storage tank water at 130°F. is reused in the jet condenser, maintaining a closed system.

This Bowaters Carolina Corporation installation at Catawba, S. Carolina, not only converts this intermittent waste heat into a continuous source of hot process water but does it in a small compact unit based on the unusually high efficiency of the De Laval Plate

Heat Exchanger. The stainless steel plate construction assures a long life and quick access for easy cleaning when required.

For more conventional heat-transfer problems, the De Laval Plate Heat Exchangers offer the same unique combination of structural compactness, transfer efficiency and easy operation. We would be pleased to help you evaluate their benefits in any of your existing or contemplated heat exchange processes. No obligation, of course.

# **PRODUCTION REQUIREMENTS DE LAVAL PROCESS EQUIPMENT**

CENTRIFUGES • PLATE HEAT EXCHANGERS • VIBRATING SCREENS • COMPLETE PROCESSES

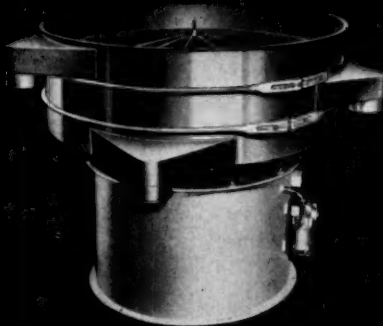
## **3-way vibration ups output 91% and prevents loss of usable coarse fines**

**Problem:** As received from dryer, muriate of potash contained considerable fines and required dedusting before bagging and warehousing. The existing gyratory screen separator could not handle the load.

**Solution:** The *three dimensional motion* of a De Laval Syncro-Matic Separator increased screening efficiency to

give 91% greater product throughput. The more thorough screening action also permitted the use of a 24-mesh bolting cloth in place of the coarser 18-mesh bolting cloth previously found necessary. An extra benefit of the increased throughput, therefore, was the recovery of fine crystals that in the original equipment were lost with the fines.

Constructed of carbon steel or stainless steel, the De Laval Syncro-Matics accommodate a full range of screen sizes and are available in one, two or three decks. Screen motion is *horizontal*, *gyratory* and *vertical* to provide unmatched screening efficiency. For more information, just write us on your letterhead. No obligation, of course.



# WYANDOTTE PURECAL®

## makes countless things better because it's so pure, so white, so uniform

Compare a comma, and a period. Just a whisker of difference between them — but it's important — and grit on the printing press can wear it away.

That's where Wyandotte PURECAL offers an important advantage as a printing ink pigment extender. It's free from grit! You see, Wyandotte's double refining — a unique reaction process — yields precipitated calcium carbonate that is free from abrasive impurities.

What's more, PURECAL — the whitest material in its class — exceeds U.S.P. purity standards, so it makes not only printing inks, but countless other products

better. To name just a few: paints, coated papers, plastics, and pharmaceutical products.

PURECAL particles are exceptionally uniform, and consistently cubical in shape . . . characteristics that improve flow. So if your formulation calls for calcium carbonate — get the purity, whiteness and uniformity that PURECAL can give you. Samples and data are available for the writing. Because PURECAL comes in various grades for specific applications, please include details on your requirements. *Wyandotte Chemicals Corporation, Department 3-E, Wyandotte, Michigan. Offices in principal cities.*

# Wyandotte CHEMICALS

**MICHIGAN ALKALI DIVISION**  
PACING PROGRESS WITH CREATIVE CHEMISTRY

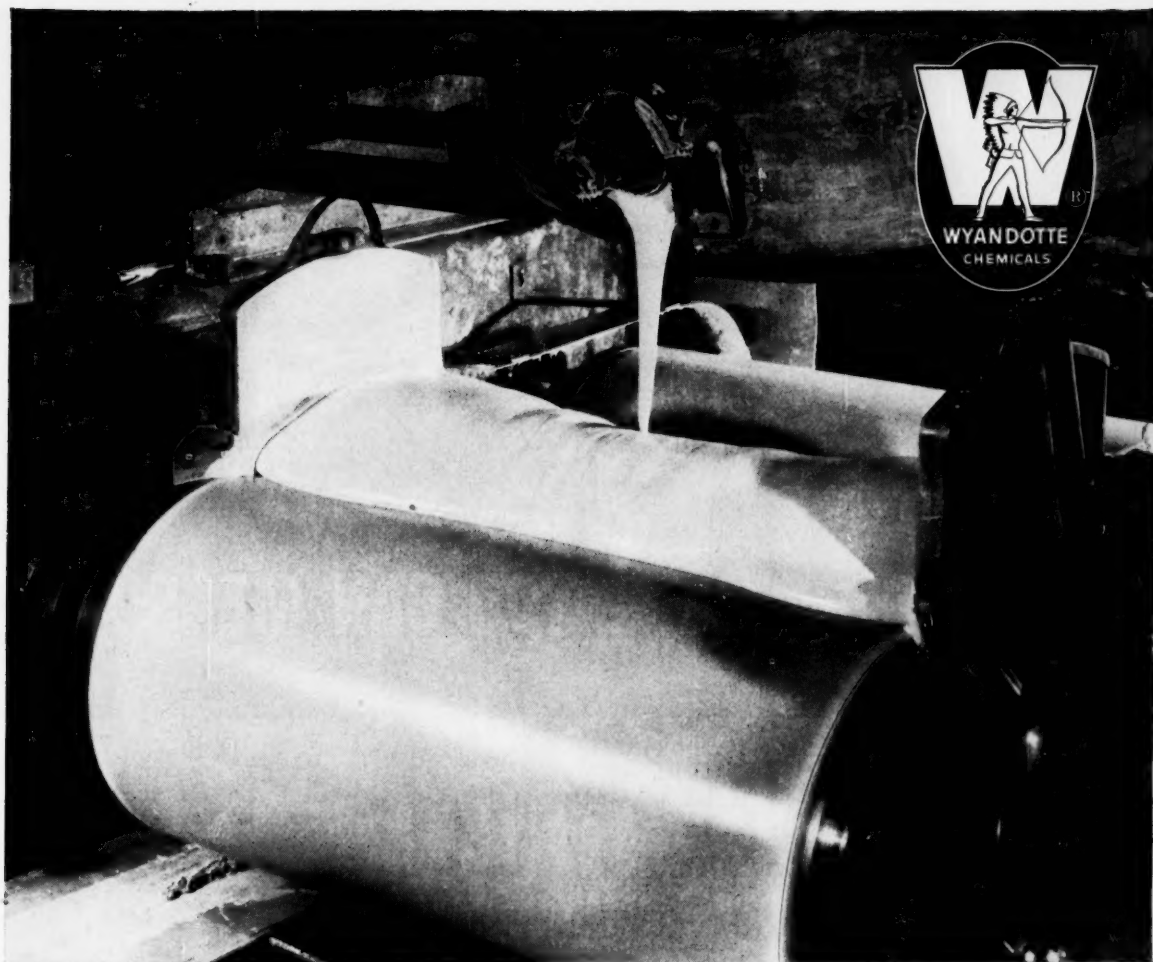
SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE • MURIATIC ACID • HYDROGEN • DRY ICE • GLYCOLS  
SYNTHETIC DETERGENTS (anionic and nonionic) • SODIUM CMC • ETHYLENE OXIDE • ETHYLENE DICHLORIDE • POLYETHYLENE GLYCOL • PROPYLENE OXIDE  
PROPYLENE DICHLORIDE • POLYPROPYLENE GLYCOL • DICHLORODIMETHYLHYDANTOIN • CHLORINATED SOLVENTS • OTHER ORGANIC AND INORGANIC CHEMICALS



PURECAL improves physical properties of non-black rubber goods, replaces costly zinc oxide in white sidewall tire stocks — with equivalent results.



Molded for comfort, glass-fiber-reinforced plastic chairs are kinder to the eye—and purse—thanks to PURECAL's unique advantages as a resin extender.



Smooth-as-cream printing inks suit printers to a T—because they give faithful reproduction, and keep plates in good

shape longer. Pure, white, uniform PURECAL particles extend printing-ink pigments . . . give body without abrasiveness.



The powder on the puff is often PURECAL. A general base in face and body powders, PURECAL is also used as a filler in many other cosmetic preparations.



A healthy girl with a healthy appetite gets more good out of a cereal that's rich in calcium. PURECAL boosts the calcium content in many crisp cereals.



**FARROWTESTED TUBES...**

**QUALITY YOU CAN MEASURE**

## Republic ELECTRUNITE

### HEAT EXCHANGER TUBING...CARBON AND STAINLESS STEELS

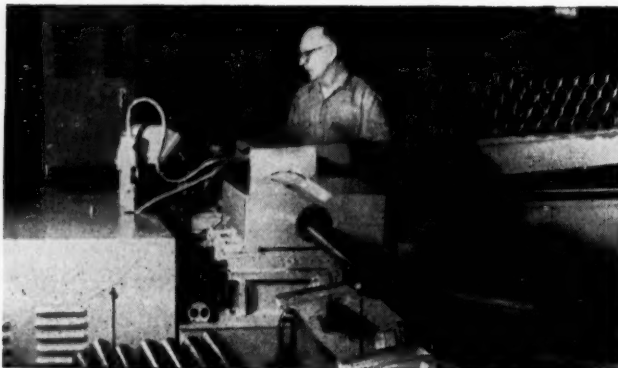
Specify FARROWTESTED Republic ELECTRUNITE® Heat Exchanger Tubing and get predictable, dependable service every time!

FARROWTESTED tubes must pass the most searching test of all, a non-destructive eddy-current test that probes for and detects injurious defects. The "magic eye" of FARROWTEST® looks deep within the tube wall, is calibrated to reject tube with defects as shown in table below. Defects that pass internal fluid or gas pressure tests cannot pass

FARROWTEST! This is an exclusive test with Republic.

*Quality you can measure!* FARROWTEST is offered as an alternative to other less positive tests at no increase in cost. Carbon steels produced to ASTM specification A-214; stainless steels to A-249. Both specifications include eddy-current requirements.

As a tube buyer and user, you owe it to yourself and your company to get ELECTRUNITE and FARROWTEST facts firsthand. Call your Republic representative. Or, use coupon and write direct.



**FARROWTEST REJECT TABLE**

Wall Thickness (S.W. Gage)	Minor dimension of the defect (Length or Depth)	Defective Area (Length, Depth Plane)
20	.006"	.0025 sq. inches
18	.006"	.003 sq. inches
16	12½% of wall	.003 sq. inches
14 and 13	12½% of wall	.004 sq. inches
12 and heavier	12½% of wall	.005 sq. inches

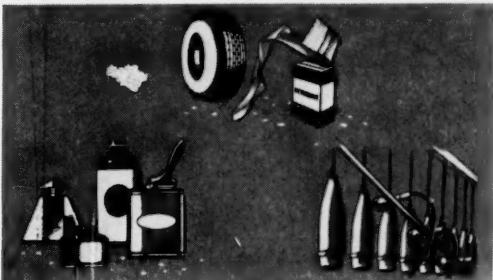
FARROWTEST detects and rejects not only tubing containing defects which completely penetrate the wall, but also tubing with defects equal to, or greater than, those shown in this table. For irregular defect shapes, a tube with defect area equal to or greater than shown above is rejectable. Where required, sensitivity of FARROWTEST equipment can be calibrated to reject defects of lesser specified area than shown in table, at extra cost.



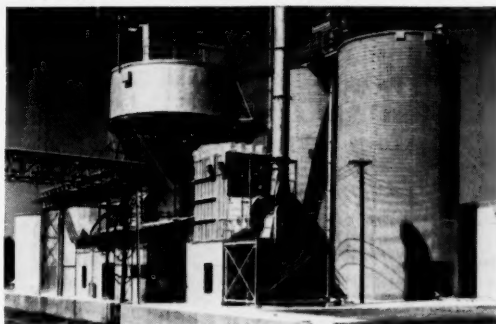
**REPUBLIC ELECTRUNITE STAINLESS STEEL HEAT EXCHANGER TUBING** rolls in easy. You get a good tight seal every time. That's why more and more refineries and processing plants are using ELECTRUNITE for original equipment and for retubing operations. Write today.



**QUALITY . . . REPUBLIC ELECTRUNITE "Dekoron®-Coated" E.M.T.** outlasts standard galvanized conduit ten-to-one in a six-year period at Charmin Paper Products Company, Green Bay, Wisconsin. Major maintenance problems were eliminated. "Dekoron-Coated" E.M.T. is protected by an armor of corrosion-proof polyethylene.



**QUALITY . . . REPUBLIC IS A BASIC PRODUCER** of many chemicals derived from coal—benzols, toluols, xylols, sulphate of ammonia, tar, crude naphthalene, pyridine, and crude heavy solvent. Like all Republic products, Coal Chemicals are quality controlled through every step of manufacturing and processing. Write today.



**QUALITY . . . REPUBLIC ENDURO® STAINLESS STEEL** protects this evaporative dryer, used in the manufacturing of kaolin for the coated paper industry. ENDURO requires only minimum maintenance, is easy to keep clean, protects purity, safeguards other chemicals from side reactions or contamination. Send coupon for more information.

# REPUBLIC STEEL



*World's Widest Range  
of Standard Steels and  
Steel Products*

## REPUBLIC STEEL CORPORATION DEPT. CE-7855-A

1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send information on the following Republic products:

- ☐ Republic ELECTRUNITE Heat Exchanger Tubing  
☐ Carbon Steel    ☐ Stainless Steel    ☐ FARROW TEST  
☐ Republic ELECTRUNITE "Dekoron-Coated" E.M.T.  
☐ Republic Coal Chemicals    ☐ ENDURO Stainless Steel

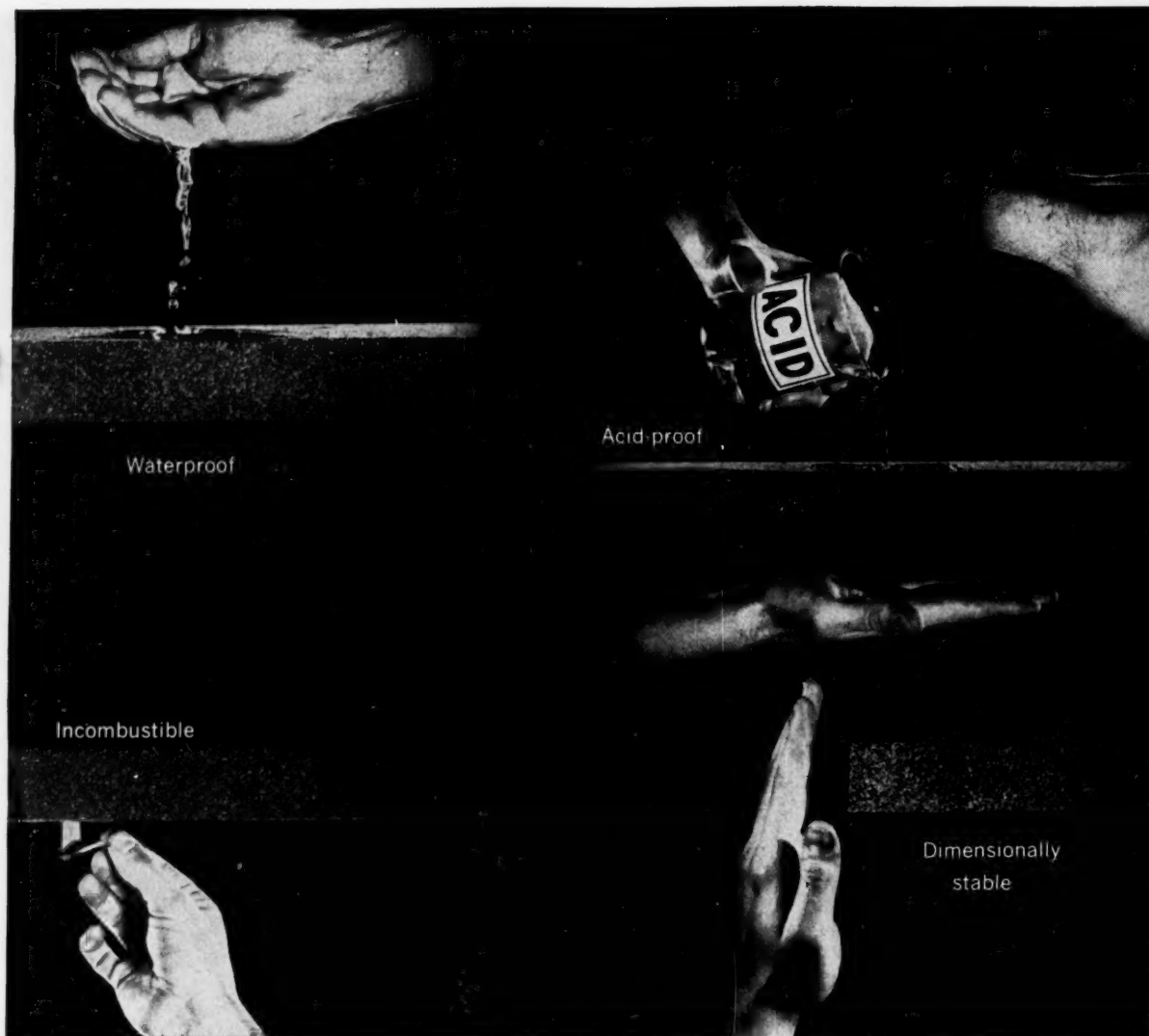
Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



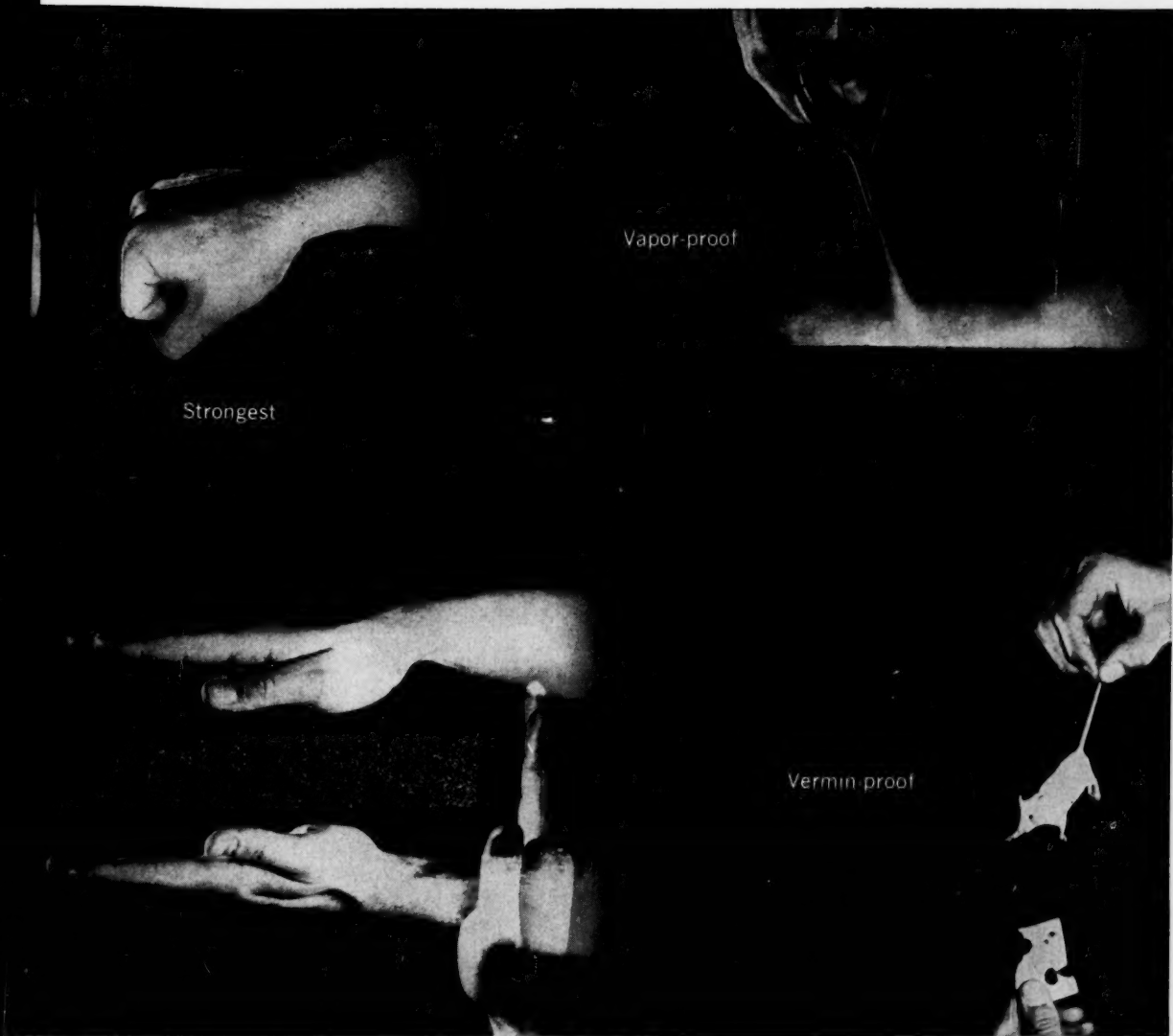


## **only FOAMGLAS<sup>®</sup> insulation hands you takes guesswork out of**

Don't gamble on the insulation for your piping and equipment. You'll find most insulations deliver just a few of the performance benefits your operating conditions call for. FOAMGLAS, on the other hand, is a unique cellular glass insulating material that hands you an unmatched combination of benefits to cover all your insulating bets.

Does your process generate vapor? Is humidity high in your area? Spillage a problem? No need to worry. FOAMGLAS is completely impervious to liquids and vapor. Its insulating effectiveness stays constant

**P I T T S B U R G H**



## ***all these benefits in one material... insulating piping and equipment***

no matter how wet your operating environment may be.

Fire hazard? Forget it. FOAMGLAS can't burn.

Is the insulation ever exposed to acids? No problem at all. FOAMGLAS is acid-proof.

Physical strength? FOAMGLAS is completely rigid and has an average ultimate compressive strength of more than 7-tons per sq. ft.

No danger of gaping joints in the insulation, either. Not with FOAMGLAS. It's dimensionally stable . . . won't shrink, swell, warp, or slump.

And just in case you've been troubled with rodents, you'll be glad to know that inorganic FOAMGLAS is vermin- and rodent-proof.

Whatever your pipe or equipment insulation problem, you're sure to find in FOAMGLAS the long lasting, no-risk solution you've been looking for. Get complete details in our Industrial Insulation Catalog.

For your free copy, write today to Pittsburgh Corning Corporation, Department H-119, One Gateway Center, Pittsburgh 22, Pennsylvania.

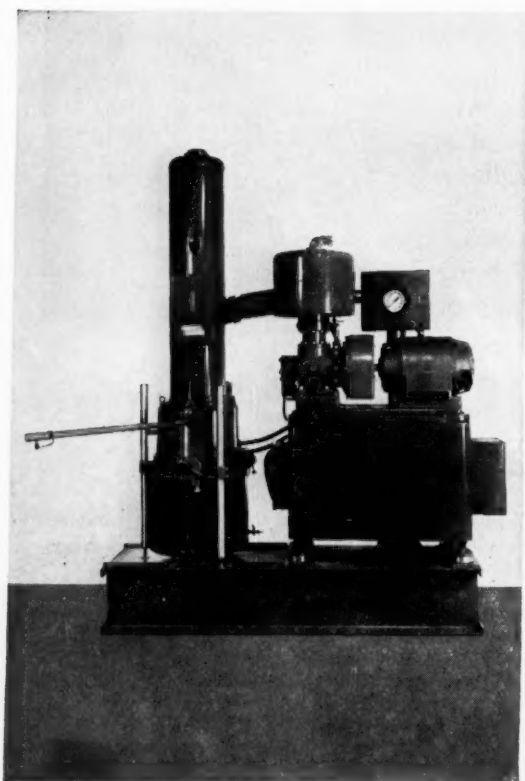


**C O R N I N G**

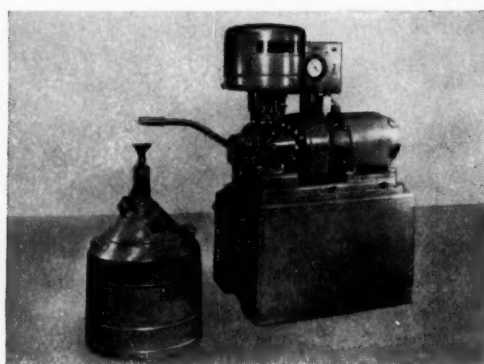
Visit us at the Chem Show, Booth No. 1239

# NORELCO

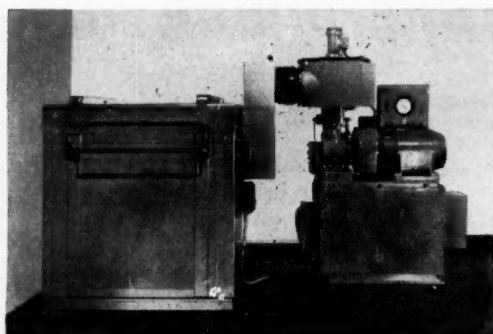
## and



**NITROGEN GENERATOR** — Comprised of a Model A Cryogenerator acting as a nitrogen condenser and an atmospheric pressure separation column. Rate of production is 6 liters per hour over an uninterrupted period up to 200 hours.



**AIR LIQUEFIER** — This unit liquefies air at atmospheric pressure — thereby insuring a contaminant-free product. Rate of production is  $7\frac{1}{2}$  liters per hour.



**ENVIRONMENTAL CHAMBER** — A specially insulated storage chest is used in conjunction with a Model A Cryogenerator. This permits the production and maintenance of temperatures down to minus 320 degrees F. for environmental testing.

**GAS PURIFICATION**  
**GAS SEPARATION**  
**AIR SEPARATION**  
**CONVERSION OF GASEOUS O<sub>2</sub> and  
N<sub>2</sub> TO LIQUID PRODUCT**  
**METAL TREATMENT**  
**COLD CHAMBERS**  
**LIQUID AIR PRODUCTION**  
**LIQUID NITROGEN PRODUCTION**  
**PRESERVATION OF BIOLOGICALS**  
**COLD MACHINING**  
**LOW TEMPERATURE PULVERIZATION**  
**SHRINK FITTING**

Visit the  
**NORELCO** display  
Booth

**935**

**Chemical Industry Show**  
**New York Coliseum**  
*November 30, December 1, 2, 3, 4*

# CRYOGENICS

All of the applications listed — and more — stem from the one unit — THE NORELCO CRYOGENERATOR. Available in four different capacities, this remarkable unit consists of a single-stage refrigeration machine designed for operation in the range of minus 320 degrees F. to ambient temperatures. As a basic cryogenic tool, the cryogenerator is completely adaptable to a tremendous number of applications and is in fact being widely used by a host of manufacturers and laboratories throughout the country.

Since the operating principle is identical for all models, specific applications of each depend primarily on the capacity of the system rather than the form of equipment. The four models, designated A, B, C and D, have respective refrigeration capacities of 3,000, 12,000, 40,000 and 160,000 BTU/hr. at minus 320 degrees Fahrenheit.

"Packaged" units consisting of a Model A Cryogenerator with special headers or accessory equipment are also available.

**Norelco**®  
*Serving Science  
and Industry*

Research facilities at the Norelco Cryogenics Application Laboratory are available for consultation on industrial problems involving any low temperature application. Write today for illustrated brochures and complete technical information.

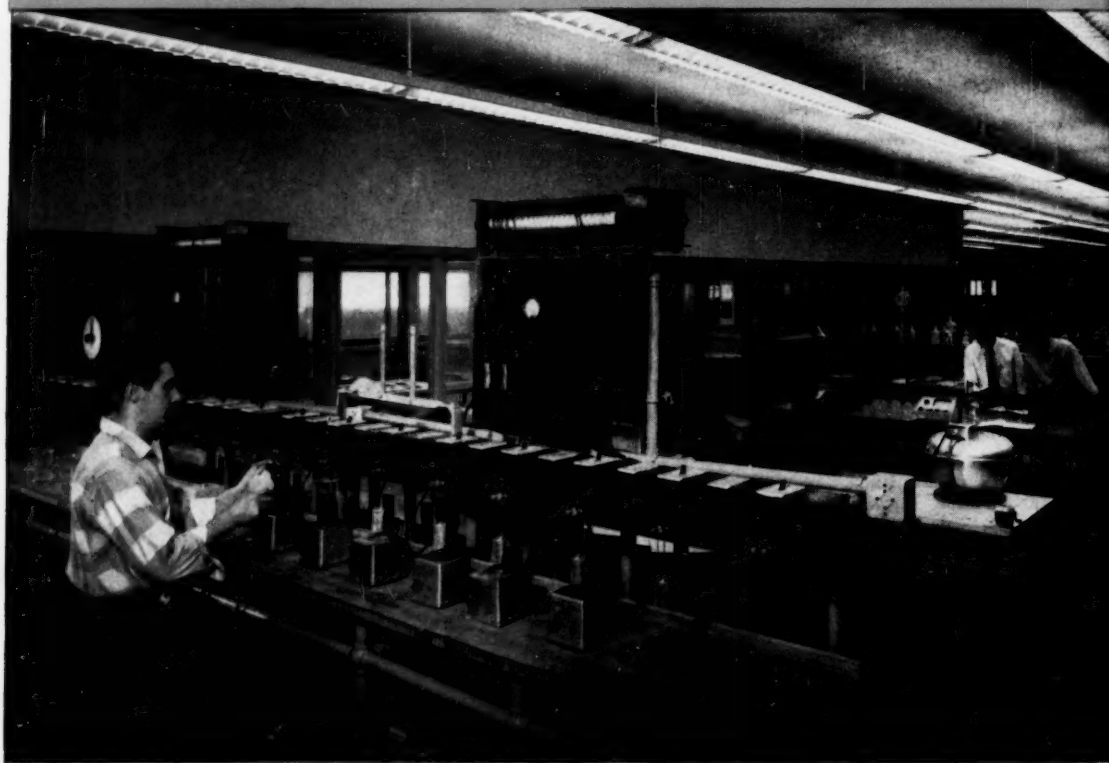
**NORTH AMERICAN PHILIPS COMPANY, Inc.**

**Cryogenics Division** 100 STEVENS AVENUE, MOUNT VERNON, N. Y.

# How lasting quality is Heat Exchange

## 5 ENGINEERING RESEARCH

(FIFTH OF A FIVE-PART SERIES)



Engineering research at new Phelps Dodge mill in South Brunswick, N. J., includes many types of laboratory tests aimed at improving quality control, providing longer tube life.



# built into Phelps Dodge and Condenser Tubes...



Recent technical advances pioneered in Phelps Dodge laboratories include tube to tube sheet welding.

More than 40 years of continuing engineering research and manufacturing experience lie behind the lasting quality and long service life of Phelps Dodge heat exchanger and condenser tubes. This vast background has constantly made new contributions to the industry. Phelps Dodge pioneered the manufacture of long length tubes, Dual-gauge tubes and bell-end tubes, keeping pace with the changing designs of heat transfer equipment. Phelps Dodge also has an established reputation as a specialist in the manufacture of duplex tubes, fluted tubes and U-bend tubes.

The Phelps Dodge research staff of chemists, engineers and metallurgists combine their skills on all kinds of tube problems. By analyzing and evaluating the key factors—water pollution, acidity, corrosion, temperature variation effects and other conditions that vitally affect tube performance—they suggest the alloy best suited for particular operating conditions.

This valuable "know-how" goes beyond laboratory analysis and alloy specifications. It is applied to increasing tube service life through ever closer control of quality and to improvement of fabricating and testing equipment. Special non-destructive tests, including eddy current, dye penetrant and ultrasonic inspections, are examples of the latest testing developments used by Phelps Dodge.

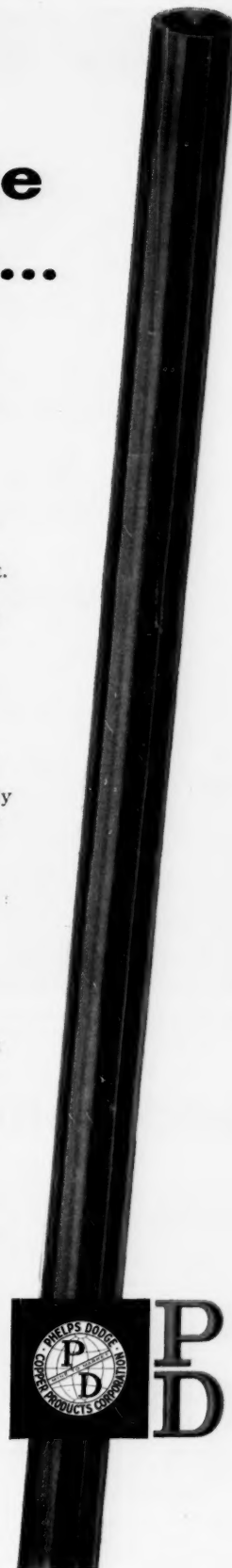
Throughout the entire tube fabricating operation—from raw materials to finished product—quality is the keynote. That's why Phelps Dodge tubes are preferred by those who demand the finest . . . the manufacturers and users of heat exchangers and condensers.

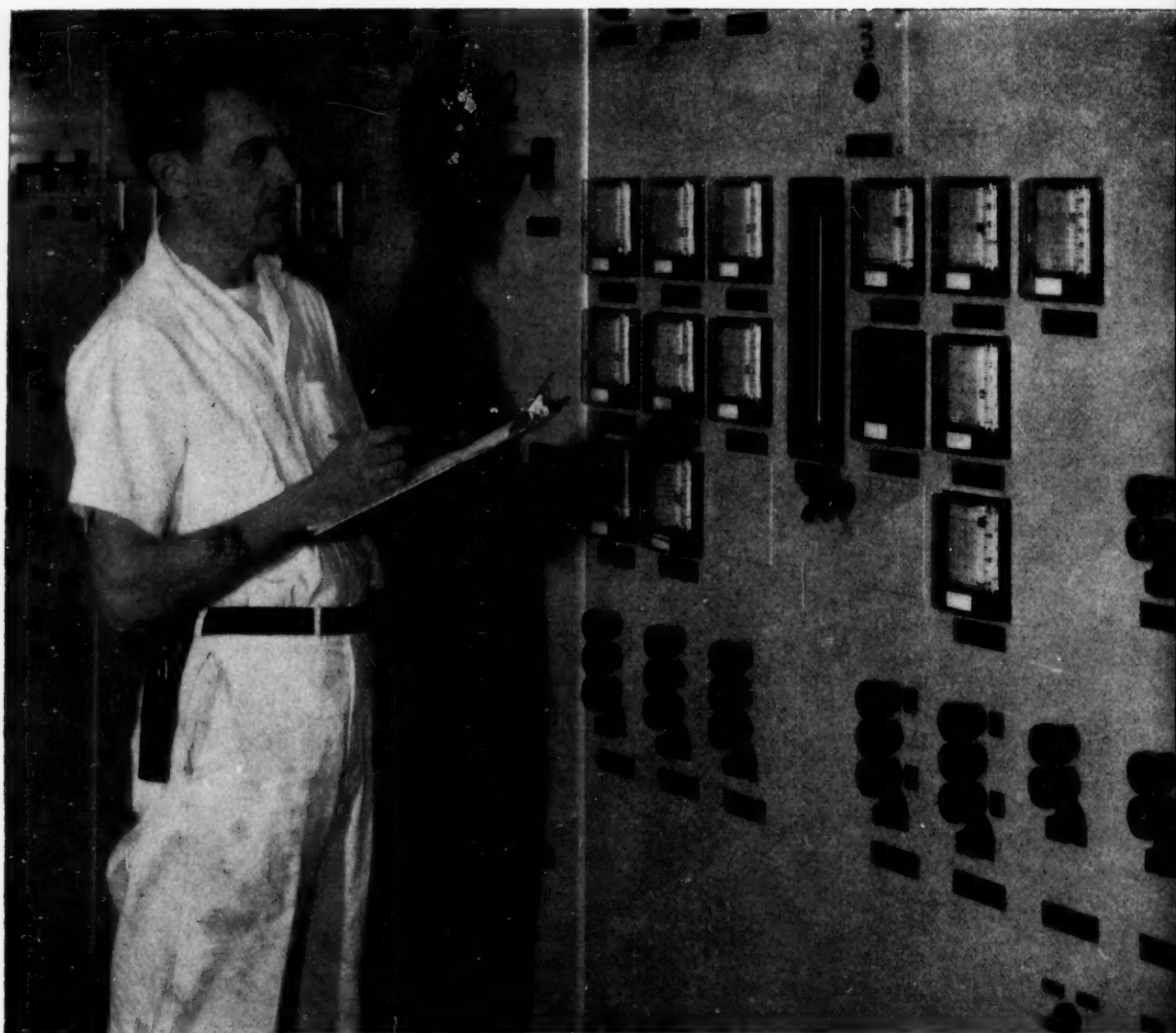
## PHELPS DODGE COPPER PRODUCTS CORPORATION

*First for Lasting Quality—from Mine to Market!*

**SALES OFFICES:** Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Fort Wayne, Greensboro, N. C., Houston, Indianapolis, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

CHEMICAL ENGINEERING—November 16, 1959

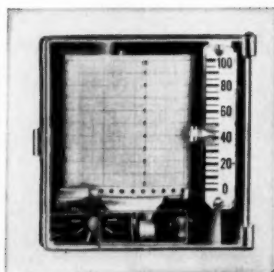




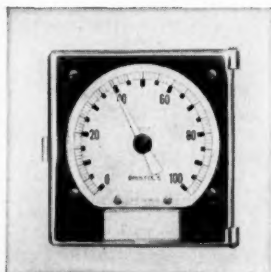
Typical installation of Bristol Metagraphic receivers. This modern instrument installation is part of main control panel at Celanese Corporation

of America's new Celanese acetate film plant at Belvidere, New Jersey. Panel designed and built by Panellit Inc., Skokie, Illinois.

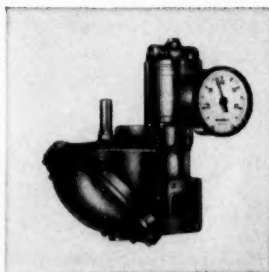
## ...and behind every panel, precision



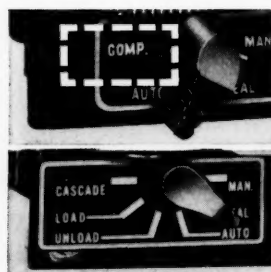
**Metagraphic Recording Receiver...** plugs and unplugs in 5 seconds. More than 36 pneumatic models, many electronic Dynamaster® potentiometer and bridge instruments—all with easy-to-read, human-engineered scales and charts.



**Metagraphic Indicating Receiver...** feature 9 inches of effective scale length, complete 10-second interchangeability with recorder of same type. Functionally colored pointers, plus long scale length makes distant reading easy.



**Metagraphic Pneumatic Transmitters** measure temperature, pressure, vacuum, absolute pressure, differential pressure, flow, liquid level or mechanical motion. Transmit on universal 3-15 psi pneumatic signal.



**Pneumatic Control Stations** allow utmost in operating flexibility. Four-position station (top) for computer-controlled refineries and chemical plants. Six-position station (bottom) for bumpless transfer in cascade systems. Many others available.

*regardless of the nature of your  
measurement or control problem,*

## **Bristol has matching miniature instruments for it**

• **Pneumatic transmission and control** • **Electronic potentiometers and bridges** • **Instruments for process computer systems** • **Electronic measurement—pneumatic transmission** • **Telemetry instruments** • **Recording gauges**

Now, for the first time, you can get matching instruments for graphic panels, consoles, or other set-ups for all your process requirements—including electronic, pneumatic, telemetering, and gauge measurements. Bristol miniature instruments all have 5" x 5 1/8" panel dimensions, fit 4 9/16" square cutout, and harmonize perfectly with each other.

**Pneumatic Transmission.** Bristol Pneumatic Metagraphic receivers operate on a universal 3-15 psi signal. They indicate or record *pressure, differential pressure, absolute pressure, liquid level, flow, temperature, mechanical motion and many other variables*. Indicators and recorders interchange on a full plug-in basis. There are 36 receivers, 38 controllers, and widest variety of transmitters in the industry to choose from.

**Process Computer Control Instrumentation.** Now available: two entirely new Metagraphic control stations, for use with process control computer systems.

**Dynamaster® Electronic Potentiometers and Bridges,** using same time-proven principles as full-size instruments, can provide measurements from such electrical sensing ele-

ments as thermocouples, strain gauges, pH electrodes, photoelectric cells, etc. Same high accuracy and reliability as full-size Dynamaster instruments.

**Electronic Measurement—Pneumatic Transmission.** The Miniature Dynamaster Electronic Potentiometer and Bridge Instruments, described above, are now available as pneumatic transmitters—3-15 psi signal. They will make any measurement that can be transduced to an electrical quantity and transmit that measurement pneumatically for Metagraphic recording, indicating, and automatic control.

**Telemetry.** Metameter® telemeter receivers, in 5" x 5 1/8" case, can receive the same measurements from remote locations as their full-size counterparts. Can be installed miles from transmitter center.

**Standard Pressure Gauges . . .** now also offered in miniature-case, plug-in and non-plug-in types. Ranges from 0-3 through 0-100 psi.

For complete data, write The Bristol Company, 100 Bristol Road, Waterbury 20, Conn.

S.B.O.

\*T.M. Reg. U.S. Pat. Off.

## **BRISTOL measurement and control**



Series 663 Electronic Dynamaster potentiometer. Motor can drive almost any auxiliary devices—retransmitting slidewires, alarm contacts, analog-to-digital encoders. Available for electronic measurement—pneumatic transmission.



Metagraphic Pneumatic Controllers can plug in on receiver case, as shown here, or directly at controlled process. Proved force-balance operating principle requires almost no moving parts, nothing to wear out. 38 different models.

### **BRISTOL**

TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING  
AND TELEMETERING INSTRUMENTS

# POWELL

## FOREMOST IN VALVES FOR CHEMICAL INDUSTRIES

Over a quarter of a century ago, Powell introduced the corrosion resistant valve to fill the needs of the rapidly expanding chemical industries. And now today, after 25 years of experienced manufacture—Powell offers one of the most complete lines of corrosive resistant valves to handle practically every corrosive fluid.

Valves in every size—for 100 pounds W.P. on up!

Valves in every design—globe, angle, gate, check, "Y".

Valves in every possible metal and alloy—stainless steel, silver, nickel, Monel, Hastelloy alloys, acid bronze, aluminum, and other corrosion resistant pure metals and special alloys. *Powell also offers a complete line of bronze, iron and steel valves.*

So for all *your* industry's requirements, Powell has the right corrosion resistant valve in the right size, right design, and right metal. Look us up at the New York Chemical Industries Exposition . . . consult your local Powell distributor . . . or write directly to Powell for complete information on Powell valves and engineering services. We'll solve all your valve problems!

**Powell will be at Booth 133 at the 27th Exposition of Chemical Industries, New York City, Nov. 30-Dec. 4, for consultation on your valve problems. Look us up.**

**THE WM. POWELL COMPANY • CINCINNATI 22, OHIO**

Dependable Valves Since 1846

**POWELL** — world's largest family of valves.

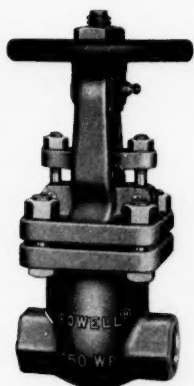


Fig. 2490  
Stainless Steel  
O.S. & Y. Gate Valve.



Fig. 1832  
Stainless Steel  
Gate Valve.

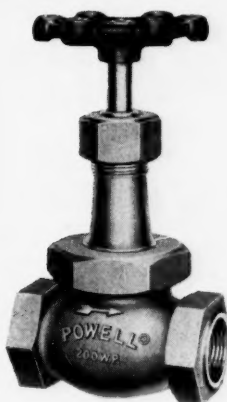


Fig. 1861  
Stainless Alloy  
Union Bonnet  
Globe Valve.

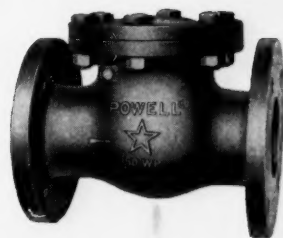


Fig. 2433SS  
Stainless Steel  
Bolted Cap  
Swing Check Valve.

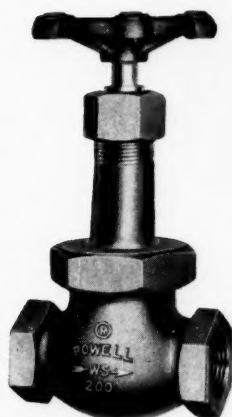


Fig. 2608  
Bronze "W.S."  
Full Flow  
Globe Valve.



Fig. 2310  
Flush Bottom  
Tank Valve.

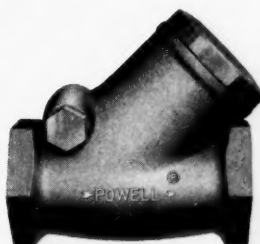


Fig. 560  
Bronze Regrinding  
Horizontal "Y" Type  
Swing Check Valve.



Fig. 2700  
Bronze Inside  
Screw Rising  
Stem Gate Valve.

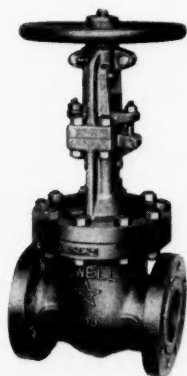


Fig. 3003  
Cast Steel  
Flange End  
Gate Valve.

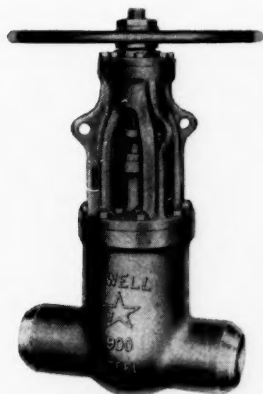


Fig. 19003  
Cast Steel  
Pressure Seal Valve.



Fig. 1793  
Iron Body,  
Bronze Mounted  
Gate Valve.



Fig. 2193  
Ni-resist O.S. & Y.  
Gate Valve.



ANOTHER IN A SERIES  
OF MOTOR FACTS  
FROM ALL INDUSTRIES



Sand ... heavy rain ... extreme heat ...

# Nothing stops These Westinghouse *Life-Line* **A** Motors

*dependably driving oil well pumps in Odessa, Texas  
district of The Atlantic Refining Company,  
24 hours per day, 7 days a week!*

"Here's an application," says A. P. Johnston, production engineer at The Atlantic Refining Company, "where we must have continuous motor operation . . . sometimes for as long as 18 months . . . with virtually no maintenance or repair. Many of our pumping stations are remotely located, automatic and unmanned. Any stoppage or motor failure would result in the loss of several hundred barrels of oil. Motor repairs in the field are prohibitive in cost. We must have *complete* motor reliability and that's

exactly what we get from our Westinghouse Life-Line® "A" motors."

How about you? Got a really tough motor application which you can't afford to pamper? Then ask your Westinghouse sales engineer to show you how the dependable Life-Line "A" pays for itself through reduced maintenance and repair. Or write to Westinghouse Electric Corp., P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J-22055-R

YOU CAN BE SURE...IF IT'S

## Westinghouse

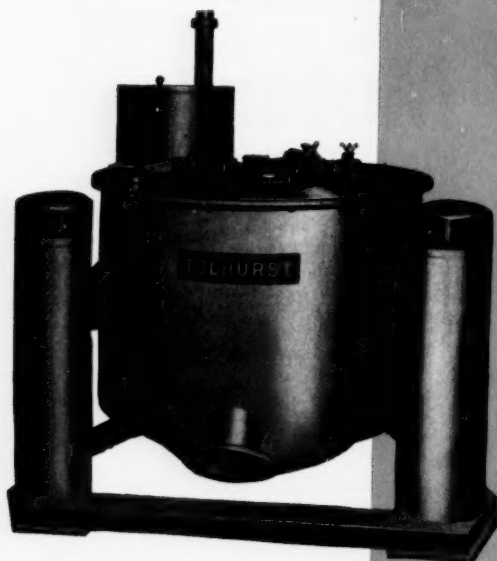


On this pumping unit, the 15-hp Life-Line "A" motor operates in an atmosphere of damaging dust, sand and moisture. Despite continuous, heavy-duty service, motor has never suffered any overheating since first installed. Prelubricated bearings of the Life-Line "A" eliminate periodic greasing . . . keep lubricant in . . . dirt out.



# Specialists in Liquid-

## OFFER THIS COM



See Us at Booths  
No. 456, 506 and 556  
During 1959  
Chemical Show

## Tolhurst®

### CENTRIFUGALS

- BATCH-O-MATIC®
- BATCH-MASTER®
- SUSPENDED
- CENTER-SLUNG®
- MAXI-FLEX®
- CONTINUOUS

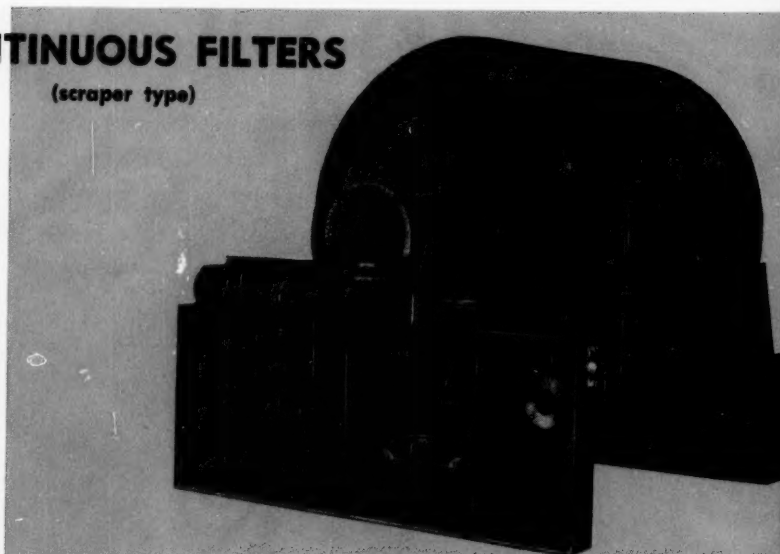
## FE INC®

### CONTINUOUS FILTERS

(scraper type)

*Custom Engineered*

- VACUUM  
OR  
PRESSURE  
ROTARY DRUM
- HORIZONTAL  
TABLE
- PRECOAT



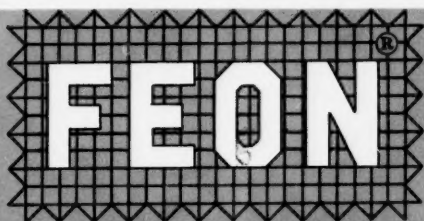
# Solids Separation

COMPLETE UNBIASED SERVICE

## Niagara<sup>®</sup> FILTERS



- **VERTICAL LEAF MODELS** in both horizontal and vertical tank designs.
- **BATCH-MISER<sup>®</sup>** horizontal plate models for polish filtration and batch operations.
- **MEET ASME** Code Construction.



Available by the roll or tailored to fit all types of fluid/solid separation process equipment.

- **NATURAL AND MAN-MADE FILTER MEDIA**

FEON Woven Textile Fiber Fabrics  
FEON Non-woven Textile Fiber Fabrics  
FEON Filter Papers by Rochester Paper Co.  
• Laboratory Tested • Production Proven

Write for literature. Please specify: TOLHURST . . . FEON . . . NIAGARA . . . FEON

DIVISIONS OF  
**American Machine and Metals, Inc.**  
EAST MOLINE, ILLINOIS

COMPLETE LABORATORY TESTING FACILITIES AT YOUR SERVICE



*Shell Chemical Corporation reports:*

# Lower structural, installation Trane Brazed Aluminum

**Air view** of Shell Chemical Corporation's Houston, Texas, plant. Lightweight and compact construction of TRANE Brazed Aluminum

Heat Exchangers made it possible to install condensing unit on top of a 140-foot tower—cutting construction costs.



## *Other major users of Trane Brazed Aluminum Heat Exchangers:*

### **Hydrogen Purification Plants**

Spencer Chemical Co.,  
Vicksburg, Miss.  
Grand River Chemical Division  
of John Deere & Co.,  
Pryor, Oklahoma  
Cooperative Farm  
Chemicals Assn.,  
Lawrence, Kansas  
Grace Chemical Co.,  
Memphis, Tenn.  
Atlantic Refining Co.,  
Philadelphia, Pa.  
Mississippi River Fuel Corp.,  
St. Louis, Mo.  
Northern Chemical Industries,  
Searsport, Maine  
St. Paul Ammonia Products, Inc.,  
Pine Bend Plant  
P.O. Box 418  
South St. Paul, Minn.

### **Air Liquefaction Plants**

Weirton Steel Company  
Division of  
National Steel Corporation,  
Weirton, West Virginia  
Air Reduction Sales Co.,  
Chicago, Ill., Butler, Pa.,  
Riverton, N. J.  
The Atlantic Refining Co.,  
Philadelphia, Pa.  
Pennsylvania Salt  
Manufacturing Company  
of Washington,  
Tacoma, Washington  
Ketona Chemical Corp.,  
Ketona, Ala.  
Monsanto Chemical Co.,  
Texas City, Texas  
U.S. Industrial Chemicals Co.,  
Division of National Distillers  
and Chemical Corporation,  
Tuscola, Illinois



# and piping costs with Heat Exchangers!

*Lightweight aluminum surface made it possible to install heat exchanger on top of 140-foot tower*

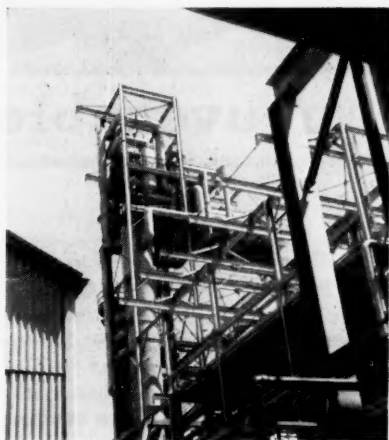
This Shell Chemical Corporation plant near Houston, Texas, has used TRANE Heat Exchange equipment for over two years in the production of ethylene. And, Shell reports, the TRANE Heat Exchanger is functioning exactly as specified . . . operating at temperatures down to  $-185^{\circ}\text{F}$ , with extremely close temperature approaches.

An outstanding feature of the installation is the location of the unit: it was erected on top of a 140-foot tower to reduce piping costs and to meet thermodynamic specifications. This type of installation was possible because of the very lightweight and compact construction of the TRANE Heat Exchanger. And it resulted in lower installation costs, savings in valuable ground space. Shell is achieving lower operating costs, too,

because of lower heat losses and extremely close temperature approaches.

This light and compact—yet rugged—heat exchange surface is being used in more and more installations where superior performance is essential. And TRANE Braze Aluminum Heat Exchangers reduce erection and space costs, too, because a typical TRANE unit requires only *half as much space* as conventional heat transfer equipment!

If you're interested in reduced refrigeration costs, close temperature approaches, trouble-free operation, design with TRANE Braze Aluminum Heat Exchangers. Thirty years of specialized heat transfer experience is at your service! Ask your nearby TRANE Sales Office for complete information. Or write TRANE, La Crosse, Wisconsin.



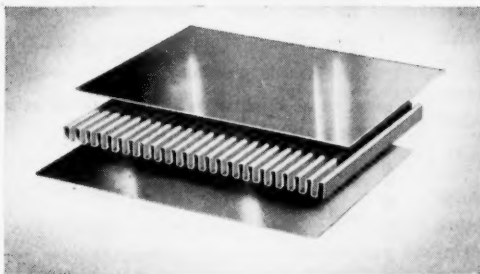
3-stream exchanger condenses a hydrocarbon gas mixture by refrigeration from two colder gases. Operating temperatures are as low as  $-185^{\circ}\text{F}$ . Design pressure is 545 psig.

For any air condition, turn to

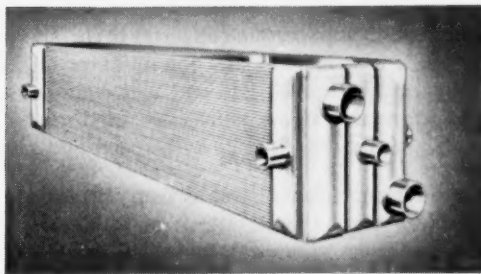
# TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING,  
VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA.  
CLARKSVILLE, MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA,  
LIMITED, TORONTO • 100 U.S. AND 19 CANADIAN OFFICES

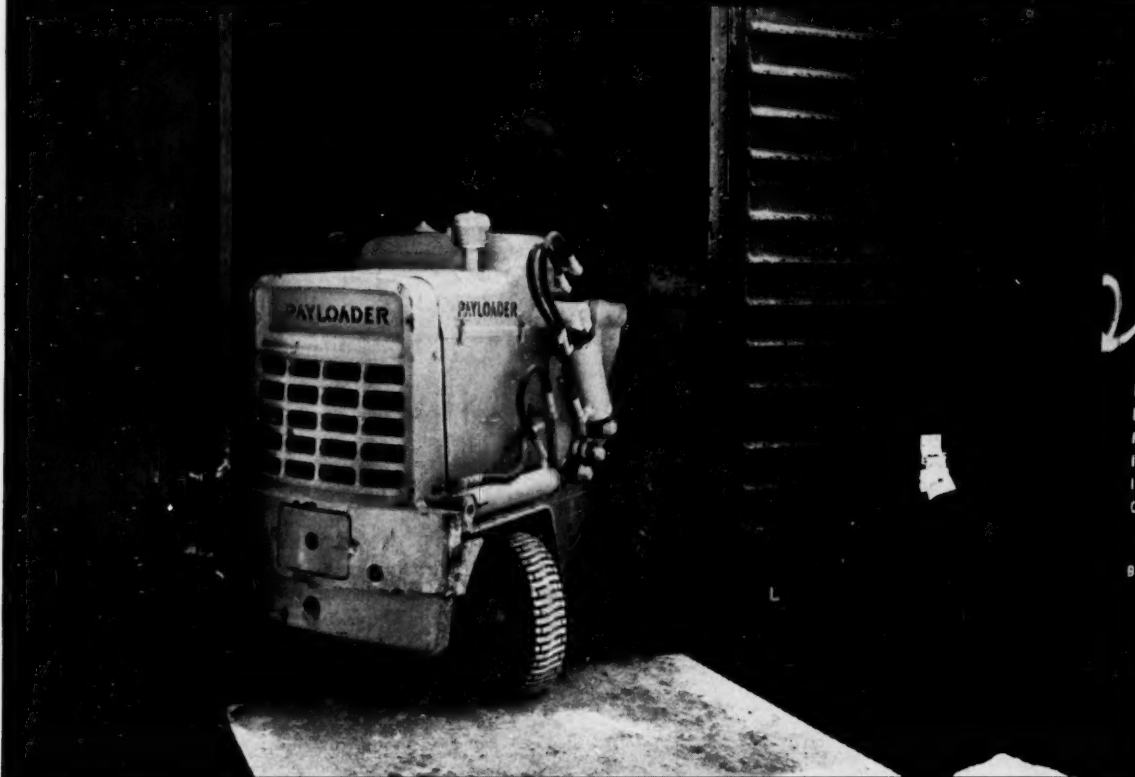


Lightweight, compact, rugged! TRANE Braze Aluminum surface consists of corrugated aluminum sheets brazed together to form a stack of layers that provide individual passages for the flow of gases or liquids. Provides up to *nine times* the surface per square foot of shell-and-tube exchangers!



Headered for 5-stream operation, this TRANE Braze Aluminum Heat Exchanger can handle as many as five fluids simultaneously. Units are available for either cross-flow or counter-flow operation. Surface can be fabricated in a wide variety of shapes and sizes to meet all types of specifications.

## PAYLOADER® is more productive



## because it's more maneuverable

Never before has so much carry capacity, ease of operation and short-turning ability been combined in a tractor-shovel. That is why the model H-25 "PAYLOADER" is setting new tonnage records on boxcar unloading and other close-quarter work. "No machine you can put in a boxcar is as good as a HOUGH," says Bob Freun of Fruen Fertilizer, Hatfield, Minn.

It digs and carries 2,500 lbs. low and close with good balance and fullest operator visibility. Power-steering and only 6-foot turning radius, power-shift transmission with torque-converter drive, and powerful hydraulic brakes all assure the operator of safe, easy and accurate control. He can maneuver around corners, through narrow aisles, doorways and crowded yards, up and down ramps with speed and safety.

Your Hough Distributor is ready to show you how the H-25 can increase output at lower cost on your bulk-handling work. Contact him today or use the coupon below.

### These features give low-cost bulk handling

2,500 lbs. carry capacity • Only 6-foot turning radius • Power-shift transmission • Power steering • Power-transfer differential • 40° bucket tipback at ground • 4,500 lb. bucket breakout force • Fullest mechanical protection • Useful extra attachments

# HOUGH®



THE FRANK G. HOUGH CO.  
LIBERTYVILLE, ILLINOIS

SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY



### THE FRANK G. HOUGH CO.

754 Sunnyside Ave., Libertyville, Ill.

- ☐ Send data on H-25 "PAYLOADER"  
☐ Other models to 12,000 lb. carry capacity

Name

Title

Company

Street

City  State

11-A-1

# ECO

# ENGINEERING

# NEWS

VOL. 1, NO. 6

*the big name in small pumps for the process industries*

## Chemical Show EXTRA

### WHAT TO SEE AT THE ECO BOOTH:

**Three Basic Pump Designs**—Rotary, Gear and Centrifugal—reason for the popular slogan, "the big name in small pumps for the process industries."

**Great Versatility**—widest variety of metals and non-metals for every corrosion and contamination problem.

**New**—Electrolytically pure Nickel Pumps for prevention of iron contamination of bromine and caustics.

**New**—Hastelloy\* B Pumps for HCl service in temperature ranges up to 160° F. Zirconium and Titanium Pumps for Boiling HCl (to 300° F).

**New**—Automatic "program" machining for mass production of Eco pumps—where multiple operations are performed to reduce needless labor and handling. Offers lower prices, precision uniformity and interchangeability of parts to meet changes in processing requirements and to facilitate field servicing.

### UNUSUAL SERVICES

**See** the pumps used on the Atomic, Missile-Firing Submarines.

**See** the pumps used in the refining process of U-235 and in Selective Ore Preparation for the chemical extraction of rare metal concentrates, round the world.

**See** the missile propellant pumps used at various launching bases and on naval units.

**See** the pumps used in the safe handling of hydrogen peroxide, hydrazine, nitroglycerine and other fluids subject to explosion wave propagation.

*(continued on next page)*

## ECO BOOTH NO. 978 "HAVEN for TROUBLED PUMPERS"



Designer's sketch doesn't show seats to soothe aching feet—but they will be there.

### A CORDIAL INVITATION . . .

is extended to all attending the 37th Exposition of the Chemical Industries at the New York Coliseum, Nov. 30th to Dec. 4th, to visit the Eco Engineering Company Booth No. 978.

### SEE WHAT'S NEW

To give you a preview of what to look for at the Eco Booth (or if conditions necessitate your seeing the chemical show from your desk), these four pages illustrate and describe the outstanding improvements and new products which Eco Engineering Company exhibit for the first time.

Check these developments in relation to your own processing problems and

plan to investigate them further at the show.

### GET CONCRETE APPLICATION INFORMATION

The Eco Booth will be manned by chemical engineers and practical pump specialists with many years of experience in difficult fluid handling problems.

They will be ready to give you on-the-spot answers on concrete applications—practical advice and money-saving suggestions on how to handle the most troublesome media, minimize corrosion and contamination, secure maximum efficiency, lower first cost and maintenance expense, and reduce down time to a fraction. See us at the show . . . or write us regarding your specific problems.

### ECO Products for Handling Corrosive and Hazardous Processing Fluids

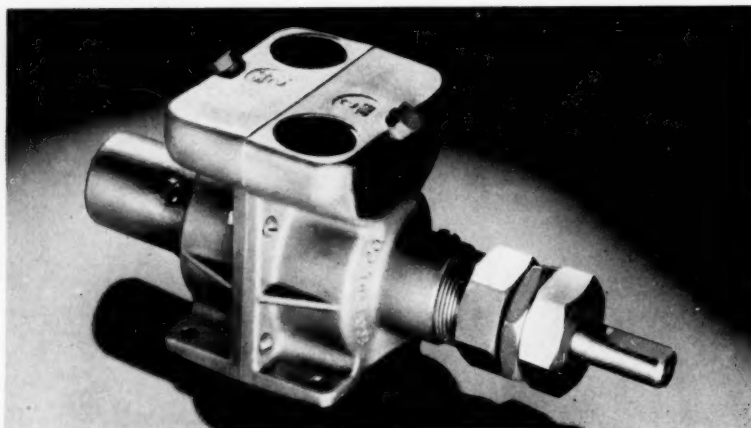
**ALL-CHEM®** Rotary Pumps  
**MINILAB®** Rotary Pumps  
**GEAR-CHEM®** Gear Pumps  
**CENTRI-CHEM®** Centrifugal Pumps

**PUMPMOBILE®** Portable Pumping Units  
**GEAR-VAC®** Valves  
**CHEMICAL DISPENSING VALVES**  
Factory Mutual Approved

Ask for literature on any or all of these ECO Products

\*Union Carbide Trademark.

ECO ENGINEERING COMPANY • 12 New York Avenue • NEWARK 1, N.J.



## ECO ALL-CHEM PUMPS

Rotary displacement pumps with two opposed impellers producing two overlapping discharge and suction strokes per revolution for linear, non-segmented, non-aerated flows. Ideal for shear-sensitive emulsions. Safe for auto-detonating fluids. Designed for severe corrosive service.

Housings of 304, 316 and Carpenter 20 Stainless Steel, Hastelloy B and C.

Bearings and Seals of self-lubricating, chemically-impervious, non-contaminat-

ing du Pont TEFLON.

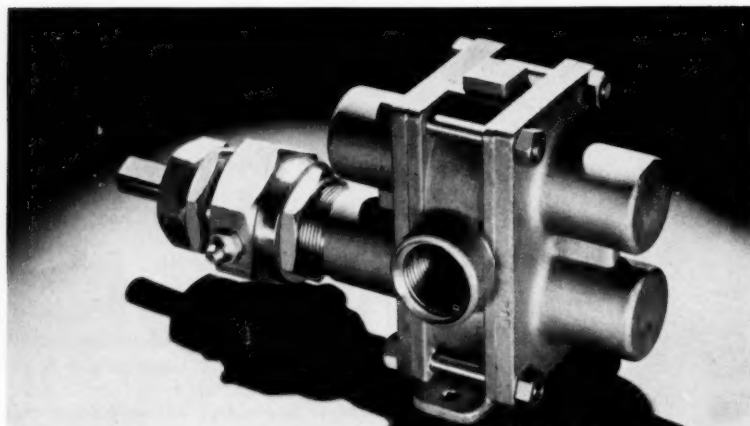
Impellers of TEFLON, phenolic plastic resins, Hypalon, Nylon, etc.

Capacities to 10 gpm, pressures to 100 psi.

Viscosities to 900 SSU and suitable for non-lubricating fluids.

Self-Priming with all non-volatile liquids.

Drives: direct 1750 rpm electric motor, air motor, pulley, sprocket and all conventional variable speed drives.



## ECO GEARCHEM PUMPS

If you require self-priming and intermittent or sustained operation with constant flow metering and reproducible accuracy within plus or minus 1 percent, or maintenance of vacuum in the micron range—handling all commercial chemicals, acids, oxidants, alkalies, aromatics, solvents—select the Eco GEARCHEM Pump.

Housings of type 316 and Carpenter 20 stainless steel, Hastelloy C and B, monel, nickel, zirconium and titanium permitting the selection of the exact metal offering greatest compatibility with the specific chemical to be pumped.

Bearings of du Pont TEFLON and carbon.

Gears of chemically-impervious TEFLON, carbon, phenolic plastic resin, Nylon, Hastelloy C.

Capacities to 10 gpm, pressures to 100 psi. at speeds to 1750 rpm with light bodied media.

Viscosities to 30,000 SSU with metallic gears and reduced speeds and volumes.

Self-priming, even with volatile fluids.

Drives: direct 1750 rpm electric motor, air-motor, pulley, sprocket, flexible shaft and all conventional variable-speed drives.

## Chemical Show EXTRA

**See** the pumps used in handling distilled and deionized water, preventing air entrainment and contamination in the pharmaceutical, photographic and electronics fields.

**See** the pumps handling liquid Sodium in paraffin oil for A.E.C. installations.

**See** the pumps handling plastics with viscosities to 45,000 SSU.

**New**—Floating wear plate design Eco GEARCHEM pump is self-compensating for wear and thermal expansion and contraction, providing the same high metering accuracy ( $\pm 1$  percent) at all temperatures from  $-70^{\circ}\text{F}$  to  $+250^{\circ}\text{F}$  and above, throughout a much longer useful life.

**New**—The famous Eco Factory Mutual Approved Stainless Steel Safety Dispensing Valve is now also available in the rare metal Titanium for corrosives outside the realm of the Stainless Steels.

**New**—The Eco GEAR-VAC Valve energizes flows of extremely high viscous media (up to 250,000 SSU)—a fluid "almost solid enough to walk upon" and dispenses them with positive metering accuracy in volumes up to 2 gpm. Revolutionary advantages: eliminates need for heating or pressurizing media, precludes sluggish, time-consuming gravity feed, offers linear flows as opposed to lumpy, spasmodic delivery.

**See** the pumps used in handling elusive mercury—bone dry, fourteen times heavier than water, a fugitive element extremely hard to contain in any stuffing box.

**See** the pumps which are maintaining vacuums in the 20 to 50 micron range in the high vacuum distillation of aromatics.

**See** the only positively non-contaminating pumping units offered industry, today.

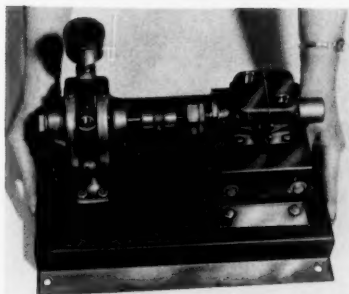
**See** the laboratory pump that handles severe corrosives, round the clock—the ideal general purpose laboratory unit.

**See** the standard, stock, centrifugal pump that meets the standardization programs of major multi-plant chemical companies, today.



the big name in small pumps for the process industries

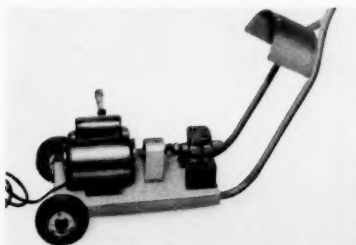
### Ask, Also, About these ECO Specialties



#### Explosion-Proof Pump Units

For handling corrosive fluids under hazardous conditions, Eco Engineering Company has designed an explosion-proof packaged pump unit, incorporating air-motor drive. This unit is available for immediate delivery. It includes a variable speed air motor coupled with any one of Eco's ALL-CHEM corrosion-resistant rotary pumps.

#### Pumpmobile

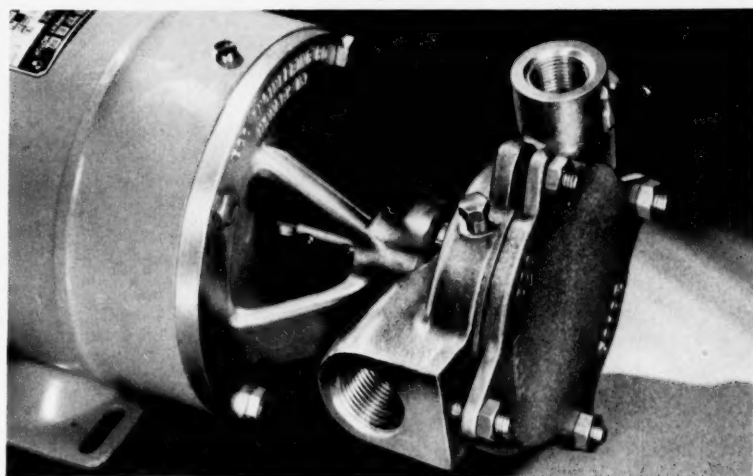


All Eco rotary and centrifugal pumps and drives are now available mounted on a portable, rubber-tired mobile unit. Measuring only 20 inches deep, the Pumpmobile is ideal for maneuverability in narrow quarters. Provides a rigid, vibration-free base and brings the pump to the point of use—wherever it may be in the plant.

#### TEFLON T-Film® Hydraulic Sealant



Eco's chemically-inert thread sealant and anti-seize compound for metal, plastic and carbon and ceramic systems and equipment, was produced originally as an aid to Eco pump users in the nuclear and corrosive chemical fields. After five years of highly successful use by the process industries, T-Film is now generally specified throughout chemical processing plants, wherever corrosives are encountered, and is regularly specified by the military services, the A.E.C. and their suppliers.



## ECO CENTRI-CHEM PUMPS

The widely applicable, centrifugal, corrosive-resistant, chemical pump. Designed for standardization in multi-plant chemical corporations. Offered in two types—close-coupled motor mounting (illustrated) and ball-bearing pedestal mounting.

Material of Construction: Carpenter 20 stainless steel throughout—castings, shafts and impellers.

Impellers: Fully enclosed or semi-open designs available.

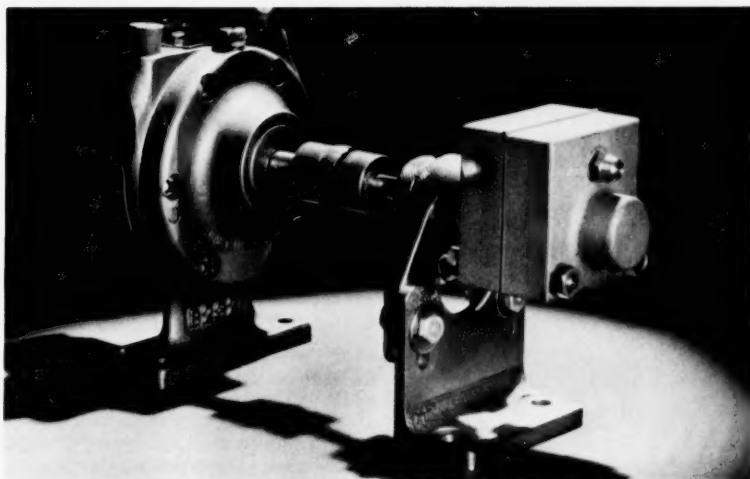
Rotary Mechanical Seal: Components to

meet various corrosive exposures, range from TEFLON and ceramic, to carbon and ceramic, to carbon and Type 20 stainless steel or stellite.

Capacities to 40 gpm at 100 psi.

Face Plates: Standard are solid stainless steel. Pyrex alternates, permitting view of pumped media, available at no extra cost.

Accessibility: Impeller and mechanical seal may be readily inspected or removed without disconnecting pump from line.



## ECO MINILAB PUMPS

The ideal all-purpose laboratory and pilot plant units.

Capacities from 0 to 2 gpm.

Handle severe corrosives—'round the clock. Self-lubricated, non-contaminating.

Hastelloy C and TEFLON construction.

Non-contaminating, self-lubricated

TEFLON bearings and seals.

Can be steam or chemically sterilized.

Yields a linear flow, best suited for constant flow metering.

Reversible. Self-priming.

Applicable for pressures up to 150 psi.





A revolutionary development handling highly viscous media (up to 250,000 SSU). Energizes flows of such media and dispenses them with positive metering accuracy in volumes up to 2 gpm.

To accomplish this, the GEARCHEM valve produces almost absolute vacuum, causing the viscous mass to collapse into the vacuum pocket, providing a constant supply in the gear chamber for positive pressure dispensing with reproducible metering accuracy within  $\pm 2$  percent.

Linear, bubble-free flows, requiring no heating or pressurizing of media, in con-

trast with lumpy, spasmodic flows of plug valves, used in this same service. Spur gears permit reversing flow.

Manual or Motor Operated—with pulley, sprocket wheel or flexible shaft drive for remote or process controlled operation on constant or cyclic flows.

Other valuable, "extra-dividend" uses.

Simplicity of Design—Complete accessibility of all working parts without removal of valve from service. Standard 150 lb. 3 in. flange connection on suction side offers unimpaird flow of viscous media to valve.

## New ECO DISPENSING VALVE

Now available in Titanium  
as well as  
Stainless Steel and Teflon.

• Factory Mutual Approved •



The rare metal, Titanium, ideal for critical services in atomic energy, electronic and chemical industry applications—offers outstanding resistance to many types of corrosive media, including some of the most troublesome industrial chemicals. Such media as nitric acid in all concentrations including white fuming nitric acid, solutions of chlorine, chlorinated organic compounds and inorganic chloride solutions, nitric-sulphuric acid mixtures and chlorinated hydrocarbons are among those handled.

The Titanium Valve utilizes the same proven fume-tight design with spring-loaded chemically-impervious TEFLON seals, that overcome seizure problems and assure instant, positive shut off or instant, full flow as desired. It eliminates dangerous after drip or leakage, putting to work outstanding safety features in the handling of some of the most hard-to-handle problem chemicals.

### New ECO LITERATURE

- GEARCHEM PUMPS—SERIES 400
- GEARCHEM PUMPS—SERIES 700
- ALL-CHEM PUMPS—PP1M AND PP2M
- NEW ADDITIONS TO ECO LINE
- EXPLOSION PROOF PUMP UNITS
- MINILAB HCT ROTARY PUMP
- MULTI-PURPOSE BRONZE DISPLACEMENT PUMPS
- CENTRI-CHEM CENTRIFUGAL PUMPS
- T-FILM THREAD SEALING COMPOUND
- SAFETY CHEMICAL DISPENSING VALVES
- GEAR-VAC VALVES

**Note:** This is a regular issue of Eco Engineering News, published in the leading Chemical Processing Papers on the occasion of the 37th Exhibition of the Chemical Industries. If you would like to continue to receive this "What's New in small pumps and allied equipment" publication, through the mail, send your application on company letterhead.

All catalogs offered above are free on request.

### ECO ENGINEERING NEWS

Published bi-monthly by  
**ECO ENGINEERING COMPANY**

Home Office & Factories  
12 New York Ave., NEWARK, N. J.  
Market 4-6565

#### U.S. SALES REPRESENTATIVES

<b>CALIFORNIA</b> , Los Angeles Madison 2-3302	<b>MARYLAND</b> , Glen Burnie SOUTHfield 6-7800
<b>DELAWARE</b> , Wilmington COLlingswood (N.J.) 5-7655	<b>NEW JERSEY</b> , Oaklyn COLlingswood 5-7655
<b>FLORIDA</b> , Pensacola HE 3-4692	<b>NEW YORK</b> , Buffalo BEDford 5600
<b>GEORGIA</b> , Atlanta MARietta 9-6423	Glens Falls 3-3210
<b>ILLINOIS</b> , Chicago FINancial 6-0968	Rochester HUBbard 2-9640
<b>KENTUCKY</b> , Louisville TWINbrook 5-6919	<b>OHIO</b> , Cincinnati PLaza 1-0583
<b>MASSACHUSETTS</b> , LYnnfield 4-4950	Cleveland MICHigan 1-4100
<b>PENNSYLVANIA</b> , Pittsburgh WALnut 1-7704	
<b>MICHIGAN</b> , Livonia KENwood 1-1785	<b>TEXAS</b> , Houston JACKson 9-2573
<b>MINNESOTA</b> , St. Paul Midway 5-5517	<b>VIRGINIA</b> , Richmond ELgin 9-5771
<b>MISSOURI</b> , St. Louis FOREst 7-5044	<b>WASHINGTON</b> , Seattle MAIn 6969

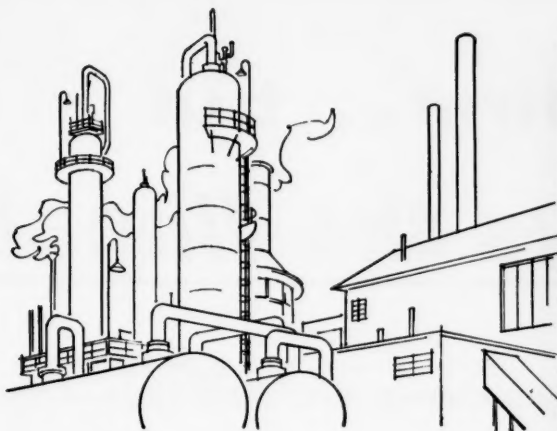
#### CANADIAN REPRESENTATIVES

**QUEBEC**, Montreal  
HUNter 9-7271

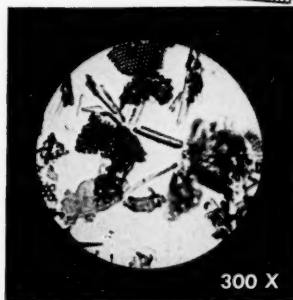
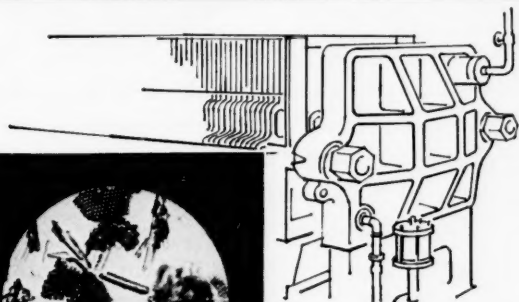
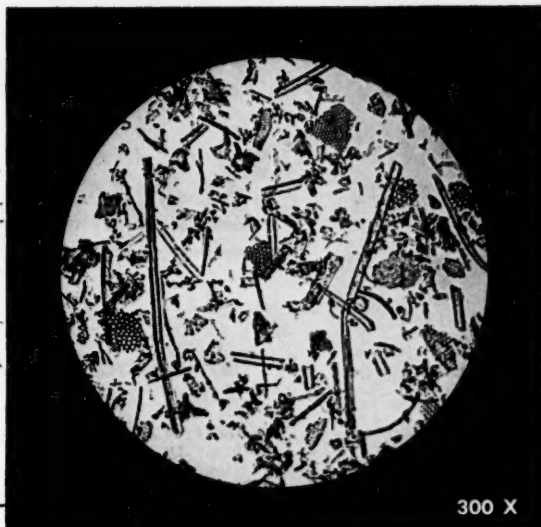
**ONTARIO**, Toronto  
EMpire 4-3329

#### EXPORT OFFICE

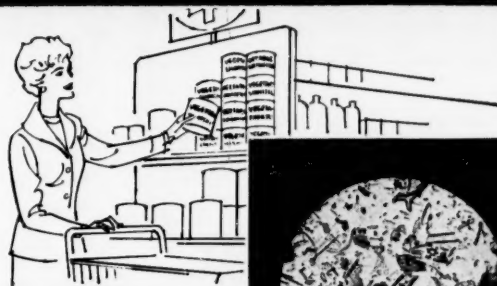
Empire State Bldg., New York, N. Y.  
PENnsylvania 6-0398



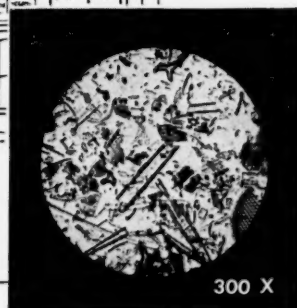
**For flow rate plus clarity**—Hyflo Super-Cel has the right combination of large and fine particles. Heavily used in chemical processes such as caustic soda production.



**For fast flow rates**—Celite 545 has a higher proportion of coarse particles. Frequently used for clarification of resins and other viscous liquids.



**For maximum clarity**—Filter-Cel has a relatively fine particle size distribution. Used in producing lard, salad oil, other hydrogenated oil products.



**In diatomites, Johns-Manville precision processing works for you**

## **Celite has the exact grade for every filtration need from fast flow rate to maximum clarity**

Study samples of various filtration grades of Celite\* diatomite with the unaided eye. Rub them between your fingers. One grade looks, feels very much like another.

Then compare these grades under the microscope. Each has its own distinctive particle size distribution. Each is precision-milled to fill the most exacting filtration requirements, ranging all the way from maximum flow rate to maximum clarity.

*Celite 545*, for example, with a higher proportion of large to fine particles, is used to remove large suspended impurities at maximum flow rates. *Hyflo Super-Cel®* has a balanced particle size distribution, combines good liquid clarity and moderate flow rate. But *Filter-Cel®* has a much higher ratio of small particles, is tailored for use where high clarity outweighs flow rate.

Whatever your filtration problem—Johns-Manville can furnish the "right"

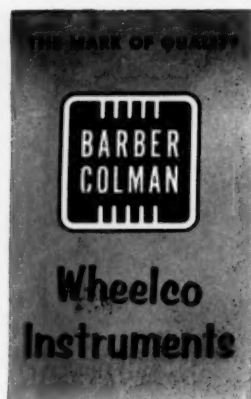
grade for the job. You have a choice of 9 intermediate grades *plus* many special grades. Each comes from the largest and purest commercially available deposit. Each is processed and graded at the same plant under the same uniform conditions.

For information on specific filtration or mineral filler problems, talk to your nearby Celite engineer, or write to us. Johns-Manville, Box 14, N. Y. 16, N. Y. In Canada, Port Credit, Ont.

\*Celite is Johns-Manville's registered trademark for its diatomaceous silica products

# **JOHNS-MANVILLE**





# Often first... but always the finest

**Wheelco offers advanced-design recorders, controllers, and indicators with field-proved features for every processing need**

Try as we may, Wheelco can't always be first with every development in processing instrumentation. But you can be sure of one thing — that every Wheelco development is backed by painstaking development work and extensive field testing, based on a quarter-century of experience gained in working on every type of processing problem.

Wheelco leadership has asserted itself in recorder-controller developments that include: constant voltage source standard at no extra cost, control forms with exclusive magnetic modulators, and plug-in components for simple inspection and maintenance. Wheelco also has pioneered gas chromatography systems offering a choice of tritium, strontium 90, or radium detectors.

These are all practical, workable developments — as sound in application as they are advanced in theory. For more details on any of the instruments outlined below, contact your nearby Wheelco instrument field engineer or write Wheelco direct. Ask for new Condensed Catalog F-5633-3.



SERIES 8000

## RECORDERS AND RECORDER-CONTROLLERS

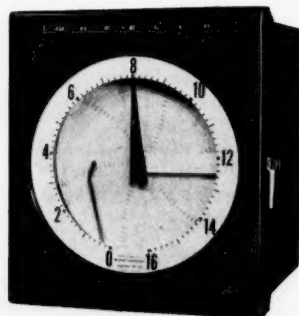
Strip and round chart recorders and recorder-controllers cover the broadest possible range of recording and controlling applications. Both styles are self-contained, null-balancing electronic instruments for measurement, indication, control, and permanent recording of temperatures and (with transducers) other variables including speed, strain, pH, etc. Any quantity that can be resolved into electrical systems can be handled on Wheelco recorders and recorder-controllers.

Wheelco multipoint recorders handle up to 24 points at speeds from 3 to 24 inches per hour. Multibank (scanner) setups permit recording 144 or more points.

Round chart recorders and recorder-controllers are available with pen speeds of 1, 4, or 20 seconds. Chart is 12 in. diameter and has a calibrated width of 4 3/4 in. Instrument accuracy is  $\pm 1/4$  of 1% for all scale spans of pyrometric range.

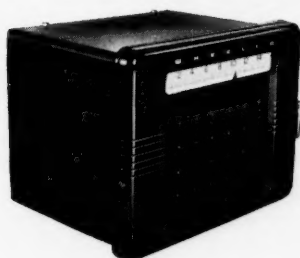
The three-function control form based on Wheelco's exclusive magnetic modulator, shown with the strip chart recorder, provides proportional reset and rate action and is available in current output, position, and duration types for either strip or round chart units.

SERIES 2000



See WHEELCO at the Chemical Industry Exposition Booth 395.

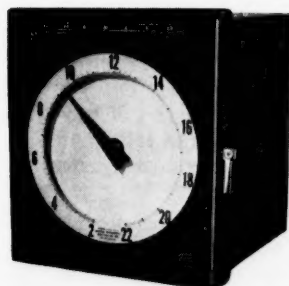
# in process instrumentation



SERIES 9000



SERIES 400



SERIES 3000

## INDICATING CONTROLLERS AND INDICATORS

Wheelco indicating controllers and indicators are the finest available anywhere and offer a wide range of choices enabling the best instrument to be selected for the specific process. The 400 Series millivoltmeter controllers, for example, are available in a choice of six different control forms to provide a perfect match with the process. In addition, only Wheelco offers 3-function control on a relatively low-cost millivoltmeter controller.

Circular scale indicating controllers have a large, bold, distant-reading scale and can use thermocouples, radiation pyrometers, and transducers as sensing elements. Wheelco 9000 Series multiswitch indicators enable temperatures or other readings to be taken at as many as 108 stations. To take readings at more stations requires additional switch cabinets only.

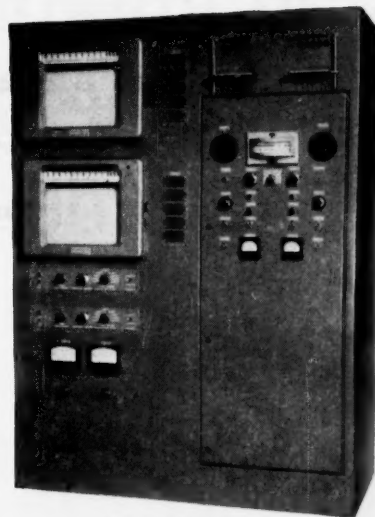
## GAS CHROMATOGRAPHY

Three types of detectors—tritium, strontium 90, and radium—are available in either the Model 10 laboratory version for single or dual operation or the Model 20, a compact, portable unit. Both models can use either capillary or packed columns.

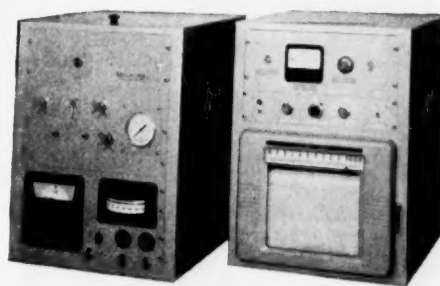
Newest addition to the line is the tritium detector for applications to 225°C that offers greater base line sensitivity due to reduced base line noise. It is only one-third as noisy as strontium 90 and one-thirtieth as noisy as radium. This detector design offers the ultimate in simplicity and ease of cleanup.

Wheelco ionization detection systems are offered with electronic integrator and automatic readout as optional equipment. With this added equipment analysis can be handled quickly and accurately by technicians who do not require special training.

Both models of Wheelco units come completely packaged, ready for immediate operation. Their modular, unitized construction makes all principal components readily accessible, facilitates modifications and adaptations.



MODEL 10



MODEL 20

## CONTROL CENTERS

Wheelco-designed and built control centers are available for every process control requirement. They may incorporate various combinations of instruments shown on these pages as well as various others in the Wheelco line. Because control centers are furnished as prewired, pre-fabricated units, installation time and costs are materially reduced and fewer problems are encountered in putting processes on the line.

# BARBER-COLMAN COMPANY

Dept. W, 1585 Rock Street, Rockford, Illinois, U.S.A.

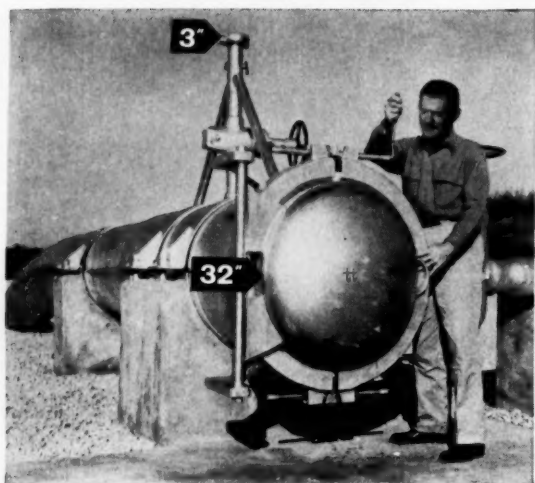
BARBER-COLMAN of CANADA, Ltd. Dept. L, Toronto

Industrial Instruments • Aircraft Controls • Electrical Components • Small Motors • Automatic Controls • Air Distribution Products • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery



# NEW...FROM TUBE

## an improved hinged closure for pipe lines, piping and process equipment



One man, using any standard wrench, can easily open or close the TUBE-TURN Hinged Closure. Has important safety features, too!



Tube Turns announces a new line of hinged closures with important advantages for pipe lines, piping and process equipment wherever frequent access is required or where the use of blind flanges would be cumbersome and time consuming. Proved in scores of applications by major companies, the unique TUBE-TURN® Hinged Closure provides these benefits:

**Saves installation time.** Light weight assembly easier to handle. Completely fabricated . . . ready to install. Requires only one butt-weld to join to pipe, tank or vessel opening.

**Saves operating cost.** One man, using a standard wrench, can easily open or close the largest size closure in a few minutes. No threads or lugs to engage or flanges to line up. No parts to fail. No hammering or tugging. Can be adapted to motorized operation. Closures for vertical applications can have counterbalanced caps for easy operation.

**Saves on maintenance.** Oil resistant, self-energizing static "O" ring provides seal. Does not move when cover is opened or closed. No rubbing or chafing to shorten seal life.

**Built-in safety.** Exclusive design features of two-piece yoke, double-ended right- and left-hand threaded bolts and hinged cap guard against accidental opening under pressure.

These new TUBE-TURN Hinged Closures provide still another *plus value* you can get when you specify TUBE-TURN products and buy them from your nearby Tube Turns' Distributor. They are available in sizes 2" through 42" for A.S.A. 150-lb, 300-lb and 600-lb service . . . in steel or alloys.

\*"TUBE-TURN" and "TT" are trademarks of Tube Turns.

*For vertical applications, TUBE-TURN Hinged Closures can be equipped with spring-loaded, counterbalanced caps.*



# TURNS...



Another **tt** plus value from...

## TUBE TURNS

DIVISION OF CHEMETRON CORPORATION

Louisville 1, Kentucky



DISTRICT OFFICES: Atlanta • Chicago • Columbus • Dallas • Denver • Detroit  
Houston • Kansas City • Los Angeles • Midland • New Orleans • New York  
Philadelphia • San Francisco • Seattle • Tulsa

IN CANADA: TUBE TURNS OF CANADA LIMITED • Ridgetown, Ontario  
DISTRICT OFFICES: Edmonton • Montreal • Toronto

**FREE BULLETIN**... Complete information on the new line of  
TUBE-TURN Hinged Closures will be sent on request. Mail coupon.

**TUBE TURNS, Dept. CE-11**  
**224 E. Broadway • Louisville 1, Kentucky**

Please send Bulletin TT956 on new TUBE-TURN  
Hinged Closures.

Company Name \_\_\_\_\_

Company Address \_\_\_\_\_

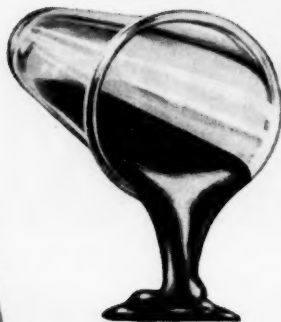
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

Your Name \_\_\_\_\_

Position \_\_\_\_\_



# NEW WORLDS OF BLENDING



# BLENDS ANY



**IN PRODUCTION QUANTITIES.** A new centrifugal force Liquid-Solids blender has evolved from P-K's exclusive "Twin-Shell" design. It blends never-before-practical combinations of liquids and solids! It reduces conventional blending operations to a single step!

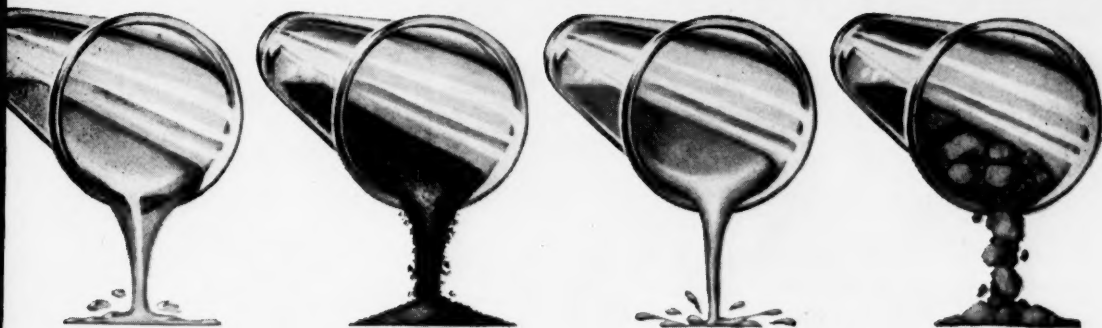
For new combinations of liquids and solids, this amazing blender offers untold advantages. Applications are limited only by imagination. They range from chemical reactions to coating very light solids such as cork, to producing all types of controlled granulations from fine to coarse.

In conventional applications, the one-step P-K Liquid-

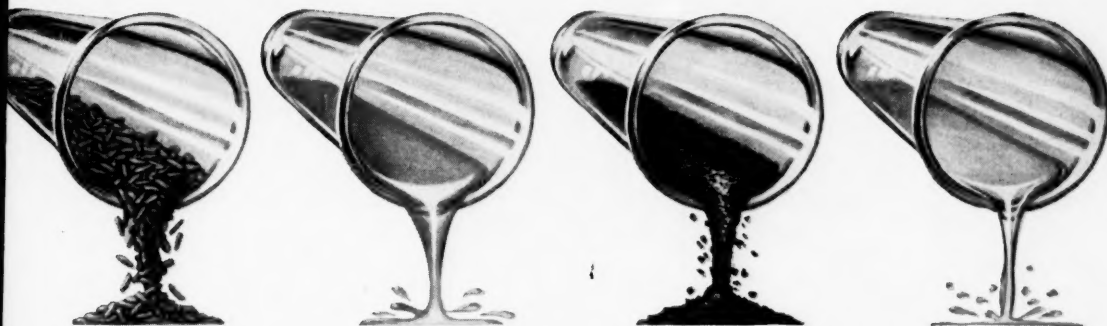
Solids blender often eliminates two and three separate stages of blending, pulverizing and screening. It replaces a multiplicity of equipment. It reduces equipment investment and materials handling costs.

P-K Liquid-Solids units blend up to 40% liquids by weight. Blending requires minutes, not hours. It involves four simple actions: 1) Dry Solids are charged to about 65% of shell volume. 2) Solids are tumbled and aerated to break up agglomerates. 3) Atomized liquid is dispersed through patented centrifugal force spray discs. 4) Product is discharged from the bottom of the blender.

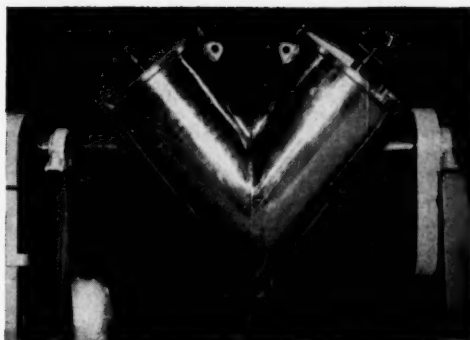
All surfaces of the blender are freely accessible. The



## POSSIBILITIES



## LIQUID WITH ANY SOLID!



Liquid-Feed bar is easily removed. These features speed cleaning and safeguard against contamination. Sizes range from laboratory models to 50 cu. ft. capacity.

**FREE PRE-TEST OFFER.** You can preview blending economies at our Laboratory. Pre-testing predicts savings in processing and handling and realistically demonstrates

the unique performance of this blender.

Our pre-test facilities for blenders – and also for P-K Vacuum Tumble Dryers – are at your disposal. Send or bring your test materials. For complete information call (Stroudsburg – Hamilton 1-7500) or write George Sweitzer at our East Stroudsburg Headquarters, 1511 Hanson Street.

15

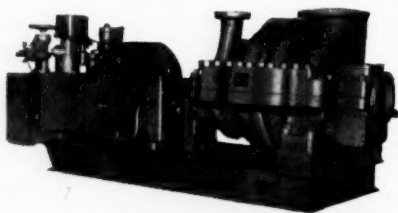
**Patterson**  **Kelley**

Chemical and Process Equipment Division, East Stroudsburg, Pennsylvania

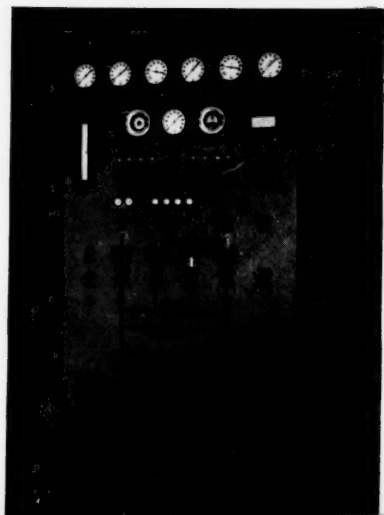


**Background:** Compressing isobutane in refrigeration-system of alkylation plant of Petro-Tex Chemical Corp. **Foreground:** Cutaway of high-pressure seal of Cooper-Bessemer Type RD Centrifugal Compressor.

**Matched to your needs . . .**  
A wide range of types and sizes of Cooper-Bessemer Centrifugal Compressors are available to assure optimum performance on your processing or air supply application.



**Undivided responsibility . . .** We can engineer the entire compressor installation, including drive and controls. Cooper-Bessemer En-Tronic® Controls provide any degree of automation.



John Fullemann, *Chief Turboprodukt Design Engineer, right,*  
and Kenneth Stevenson, *Turboprodukt Designer,*  
*The Cooper-Bessemer Corporation, discuss...*

## How reliable Cooper-Bessemer Centrifugal Compressors aid 'round-the-clock processing

For example, here's the picture at Petro-Tex Chemical Corp., Houston: The entire sulfuric acid alkylation plant banks on the dependable performance of the Cooper-Bessemer Type RD Centrifugal Compressor which handles isobutane for refrigeration. This unit operates on a continuous, 24-hour basis, handling 11,125 cfm and boosting pressure from 16.2 to 98 psia. Its constant availability is a must.

Of course, many things go into Cooper-Bessemer centrifugals to assure this kind of reliability. For example, take the two-sleeve oil film type seals shown in the illustration. This Cooper-Bessemer design is capable of sealing against pressures of more than 1000 psi, for utmost dependability in processing service.

Bear in mind, too, that the performance of Cooper-Bessemer equipment is backed by an unsurpassed service organization to help protect your plant investment and assure optimum operating economy. For further information, call our nearest office.

**BRANCH OFFICES:** Grove City • New York • Washington • Gloucester • Chicago  
Minneapolis • St. Louis • Kansas City • Tulsa • New Orleans • Shreveport • Houston  
Greggton • Dallas • Odessa • Pampa • Casper • Seattle • San Francisco • Los Angeles

**SUBSIDIARIES:** Cooper-Bessemer of Canada, Ltd. ... Edmonton • Calgary  
Toronto • Halifax

C-B Southern, Inc. ... Houston

Cooper-Bessemer International Corporation ... New York • Caracas • Mexico City  
Cooper-Bessemer, S.A. ... Chur, Switzerland • The Hague, Netherlands

**Cooper-Bessemer**

**GENERAL OFFICES: MOUNT VERNON, OHIO**

**ENGINES: GAS • DIESEL • GAS-DIESEL**  
**COMPRESSORS: RECIPROCATING AND CENTRIFUGAL**  
**ENGINE OR MOTOR DRIVEN**



# What every chemical processor should know ...about **NORTON**

You can meet a *wide* variety of chemical and petrochemical processing requirements efficiently and economically with NORTON Products. They're more than just outstanding refractory materials. In addition, they provide versatile combinations of chemical, physical, and electrical properties that make them valuable aids at many critical stages of production. Find out how these advanced materials from the NORTON electric furnaces can help *your* operations by substantially improving process and product . . . sharply reducing operating costs. If you wish, the NORTON Man will be happy to discuss processing problems with you at any time. Backed by years of experience in the field, he's well qualified to help. Write NORTON COMPANY, Refractories Division, 511 New Bond Street, Worcester 6, Massachusetts.

## FOR CATALYSIS

A full line of catalyst carriers to meet the requirements of a wide range of feedstocks and thermal conditions. For coated or impregnated use. Size, weight, porosity, pore diameter, and purity held to close tolerances to assure precise duplication of results.

SHAPES	MATERIALS	POROSITY
Spheres	Alumina	from 10% to 50%
Rings	Silicon Carbide	
Pellets	Fused Magnesia	Surface Area
Granules	Zirconia	
Powders	Silica, Zircon	From less than 1 to 70 M <sup>2</sup> /gram*
	Magnesia-Alumina Spinel, etc.	

Bulletin No. 7 gives full details.

\*BET Method

## FOR FILTRATION

A wide selection of porous media for filtration, diffusion, or aeration. Made of strong, chemically stable ALUNDUM\* fused alumina, they also have high resistance to alkalis and acids. Provide uniform flow, with pores uniformly distributed in needed sizes and open-pore ratios. Tubes, plates, discs. Catalog No. 140 provides details.

## FOR NUCLEAR WORK

Control and shield materials, including highly stable, lightweight NORBIDE\* (B<sub>4</sub>C). Metallurgical processing refractories. Ceramic fuel pellets. Source and intermediate materials.

## FOR HIGH TEMPERATURE PROCESSING

**Castables:** Highly versatile, easy-to-handle ALUNDUM fused alumina materials for insulation. Provide protection up to 3300°F. Shipped dry in moisture-protective bags, they can be mixed in minutes. Small, lightweight bubbles or dense grains. Bulletin 1992 offers details.

**Cements:** Three different heat-resisting, chemically-inert materials carefully blended to assure proper grit-size distribution. ALUNDUM fused alumina, CRYSTOLON\* silicon carbide, MAGNORITE\* fused magnesia. For troweling, ramming, patching, pressing or brick-laying. Catalog 863 provides more information.

# products

**Ceramic Spray Coatings:** Hard, crystalline materials which can be applied to a wide variety of base materials to provide thermal or electrical insulation, add mechanical strength, improve resistance to wear, corrosion, and chemical activity. ROKIDE\* "A" aluminum oxide; ROKIDE "ZS" zirconium silicate; ROKIDE "Z" zirconium oxide. Bulletins available.

**Fired Shapes:** High-purity shapes of ALUNDUM fused alumina and fused stabilized zirconia offer excellent thermal insulation and chemical stability at high temperatures under both oxidizing and reducing atmospheres. CRYSTOLON silicon carbide products are available for processes involving heat transfer and abrasion resistance. Write for Catalog 862.

ALUNDUM ware has been used successfully for many years in laboratory development, experimental and analytical work involving filtering, extractions, melting, incineration, etc., because of its chemical resistance and stability in contact with reagents and solvents. Write for Catalog 793.

\*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries



**REFRACTORIES**

Engineered...  $R_x$ ... Prescribed

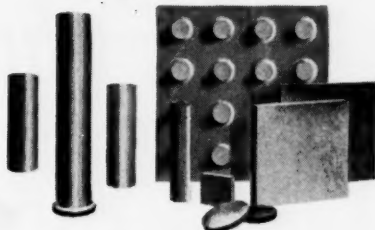
**Making better products...  
to make your products better**

**NORTON PRODUCTS:** Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electro-Chemicals — **BEHRMANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

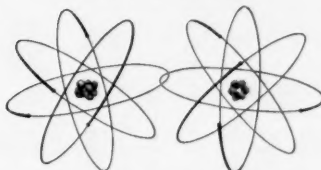
CHEMICAL ENGINEERING—November 16, 1959



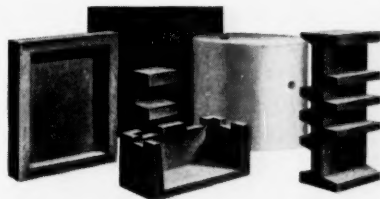
**FOR CATALYSIS**



**FOR FILTRATION**



**FOR NUCLEAR WORK**



**FOR HIGH TEMPERATURE  
PROCESSING**



**FOR THE LABORATORY**

Visit with us at the  
**1959 EXPOSITION of the  
CHEMICAL INDUSTRY**  
Spaces — 1289-90 & 91  
New York Coliseum  
Nov. 30th thru Dec. 4th

# Compact **FISHER P.O.P.** that once required *5 basic actuator sizes to cover*

## **FISHER** SERIES **470 P.O.P.** PNEUMATICALLY OPERATED PISTON

**Power:** Delivers same power in either direction at any point of the stroke.

**Speed:** For example, the size 60 gives you 1.5"/sec. stroking speed.

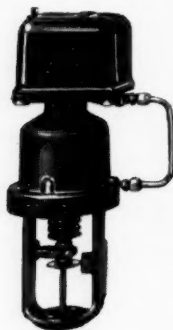
**Accuracy:** Max. Hysteresis—0.15% of stroke or signal.

Repeatability—0.03% of stroke or signal.

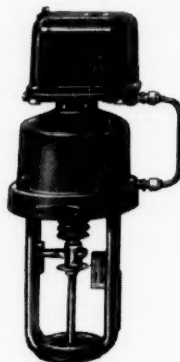
Resolution Sensitivity—0.02% of instrument pressure range.

Only Fisher gives you this wide selection of actuator-body combinations. This small, compact piston actuator incorporates its own positioner mounted integrally on top of the cylinder. Positioner receives any of the normally used pneumatic instrument signals. Then, without an air set, actuator utilizes the full potential of the available instrument air or gas supply (up to 150 psi) to provide exceptional speed and power. Easily reversible actuator can be changed in the field. Also available in spring return and side mounted handjack models.

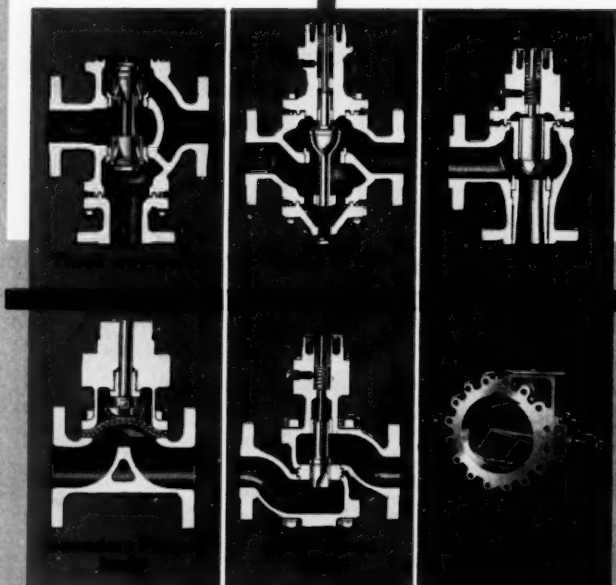
Send for free booklet E-470.



Size 30

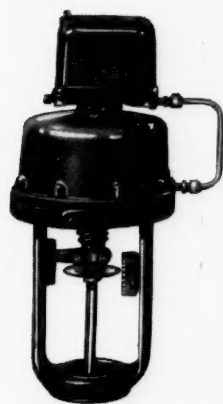


Size 40

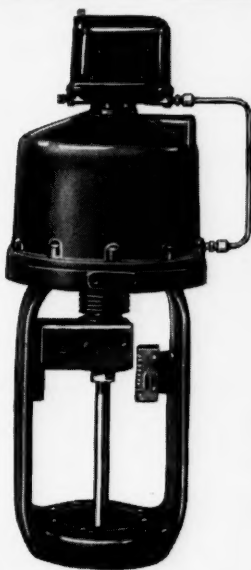


IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...

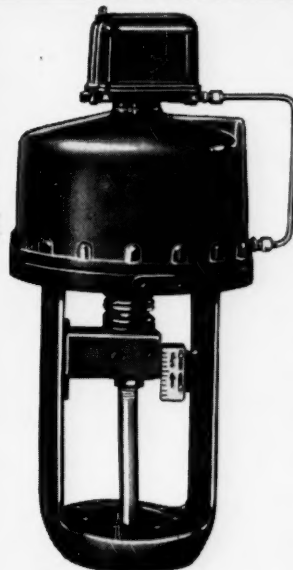
actuators handle difficult jobs  
giant-size equipment  
all body styles and sizes



Size 60



Size 80



Size 100

**SPECIFICATIONS**

Actuator Size	Cylinder Size, Inches	Stem Size, Inches	Body Size, Inches	AVAILABLE STEM FORCE		Travel, Inches
				100 PSI Supply	150 PSI Supply	
30	4 $\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$ -1 $\frac{1}{2}$	1500	—	$\frac{3}{4}$ - $\frac{3}{4}$
40	6 $\frac{1}{8}$	$\frac{1}{2}$	2-4	2500	—	$\frac{3}{4}$ -1 $\frac{1}{2}$
43	4 $\frac{3}{4}$	$\frac{1}{2}$	2-4	1500	2200	$\frac{3}{4}$ -1 $\frac{1}{2}$
60	8 $\frac{1}{2}$	$\frac{3}{4}$	5-8	5000	—	$\frac{3}{4}$ -2
63	4 $\frac{3}{4}$	$\frac{3}{4}$	5-8	1500	2200	$\frac{3}{4}$ -2
64	6 $\frac{1}{8}$	$\frac{3}{4}$	5-8	2500	3600	$\frac{3}{4}$ -2
80	10 $\frac{3}{4}$	1	10-16	8000	—	$\frac{3}{4}$ -3
100	13	1 $\frac{1}{4}$	10-16	12000	—	$\frac{3}{4}$ -3

Note 1. Sizes 43, 63 and 64 may use supply pressure up to 150 psi.



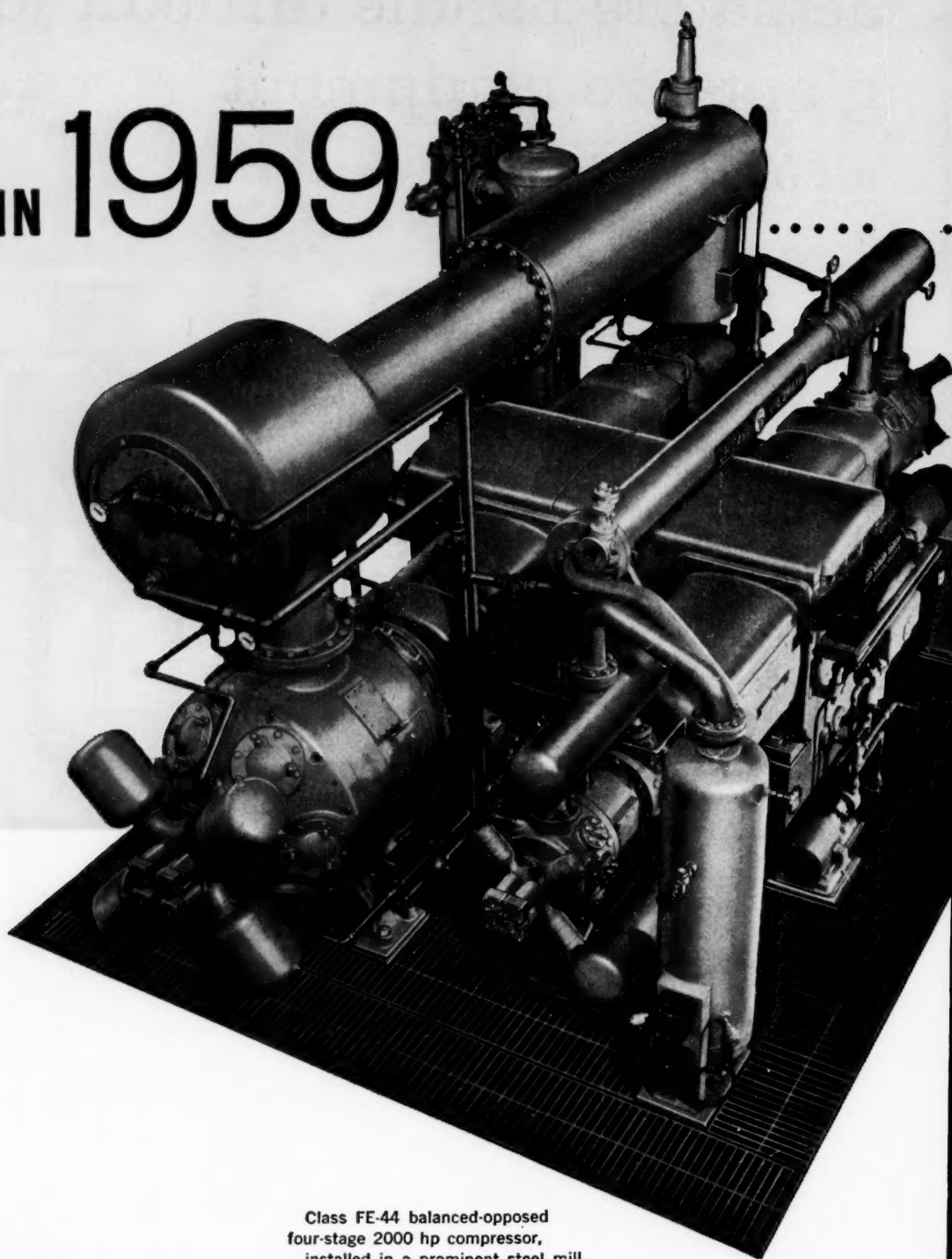
Actuator Size	B Inches	C Inches
30	19 $\frac{1}{4}$	6 $\frac{3}{4}$
40	21 $\frac{3}{4}$	8 $\frac{1}{8}$
60	23 $\frac{3}{4}$	10 $\frac{1}{2}$
80	33 $\frac{1}{4}$	12 $\frac{3}{4}$
100	33 $\frac{1}{4}$	15



**FISHER GOVERNOR COMPANY**  
Marshalltown, Iowa / Woodstock, Ontario / London, England  
BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT CO., CORAOPOLIS, PENNSYLVANIA



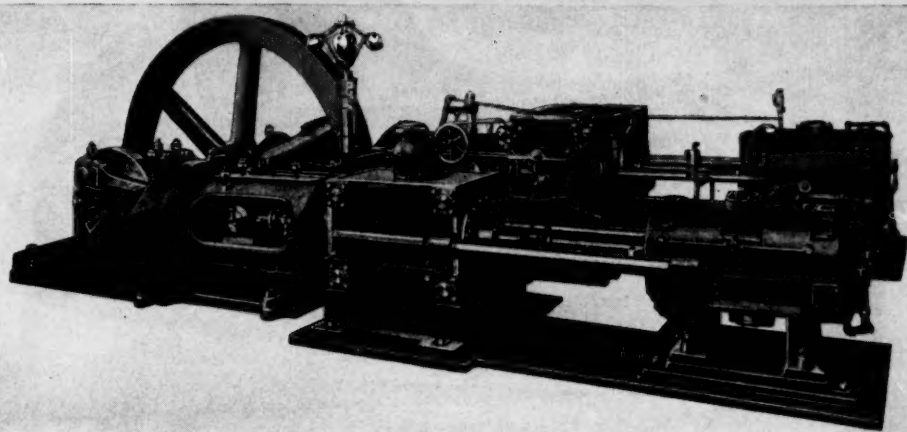
# IN 1959



Class FE-44 balanced-opposed  
four-stage 2000 hp compressor,  
installed in a prominent steel mill.



..... AS IN **1902**



"Franklin" CP Compressor, Corliss engine driven, as built in 1902.

## The CP name on an Air Compressor stands for UNEXCELLED PERFORMANCE

Maintaining a good reputation requires constant improvement of the product. For more than half a century "CHICAGO PNEUMATIC" has meant unexcelled compressor performance.

CP Compressors are built in sizes to 5000 hp for pressures up to 15,000 psig, or for vacuum service. Motor or steam drive. Lubricated or non-lubricated cylinders.



**Chicago Pneumatic** 8 East 44th Street, New York 17, N. Y.

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS

Get a good grip on handling costs and avoid hand injuries with

## AO Protectocote Neoprene Gloves

Waterproof . . . dirtproof . . . oil, grease and solvent resistant, these neoprene coated gloves have the rugged durability to cut handling costs yet are comfortably flexible with fully curved finger and thumb. Each glove is tested against AO quality standards of tensile strength, elongation, aging and other properties. Rigid quality controls (such as extremely sensitive electronic devices in vulcanizing) govern the manufacture. 6 gloves in the line — 3 with extra heavy coating on palm.



**AO 781 NEOPRENE COATED**  
A long gauntlet style that protects workers' hands and forearms completely. 14½" long.



## ... and with AO Plastifab Vinyl Plastic Gloves

A special polyvinyl resin makes these gloves 100% liquid-proof — ideal for handling oils, solvents, acids. These gloves offer wear resistant protection from jagged or sharp surfaces — it's almost impossible to rip them. WORKERS CAN MAINTAIN A TIGHT HOLD ON GREASY OR OILY SURFACES. Seamless comfort across knuckles and other areas. Vinyl plastic coating permits comfortable finger flexing and hand action. The long life of AO Plastifab provides real low-cost hand protection. 8 styles — 2 with extra heavy coating on palm. Your nearest AO Safety Products Representative can supply you.



**AO2 Popular priced, fully coated, knitwrist model. Palm and fingers comfort-curved. Special wing thumb. No seam to wear or irritate. No joints to rip or tear. Emerald green satin finish.**



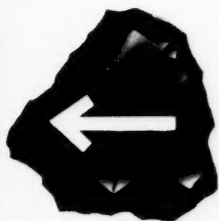
Always insist on  
AO Trademarked Safety Products

American Optical  
COMPANY  
SAFETY PRODUCTS DIVISION

**SOUTHBRIDGE, MASSACHUSETTS**  
Branches in Principal Cities

1833-1958 • 125 LEADERSHIP YEARS

pièce de résistance



This piece of new Glascote 778 frit is  
the most corrosion-resistant glass ever applied  
to chemical processing equipment.

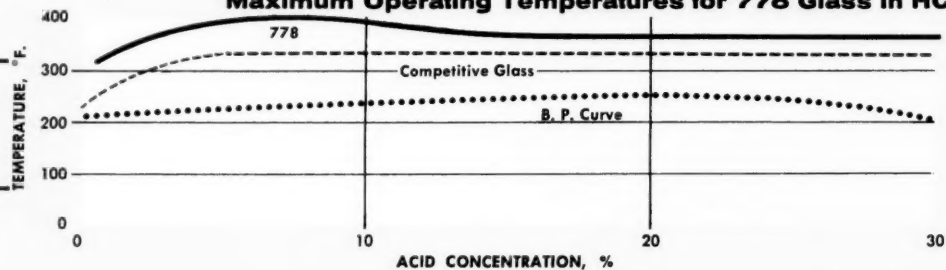
# Now! Unmatched Glascote.

More acid-resistant at up to **75° F** higher operating temperatures

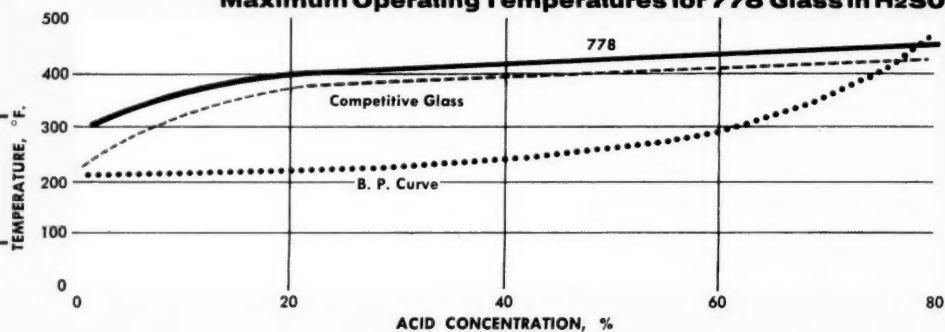
Here's graphic proof that you can speed up reaction time in vessels lined with Glascote 778. The data shown in these charts is substantiated by testing methods presented by D. K. Hoganson at the 1959

annual convention of the American Ceramic Society. We would be happy to send you more complete details on this testing procedure. Drop us a line and your request will receive prompt attention.

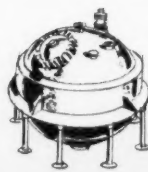
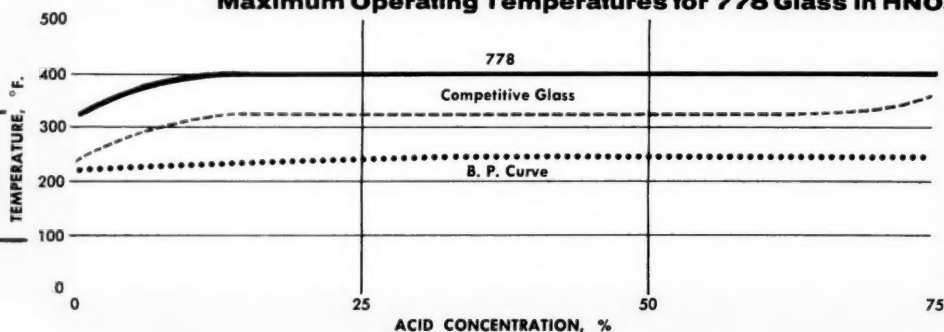
**Maximum Operating Temperatures for 778 Glass in HCl**



**Maximum Operating Temperatures for 778 Glass in H<sub>2</sub>SO<sub>4</sub>**



**Maximum Operating Temperatures for 778 Glass in HNO<sub>3</sub>**



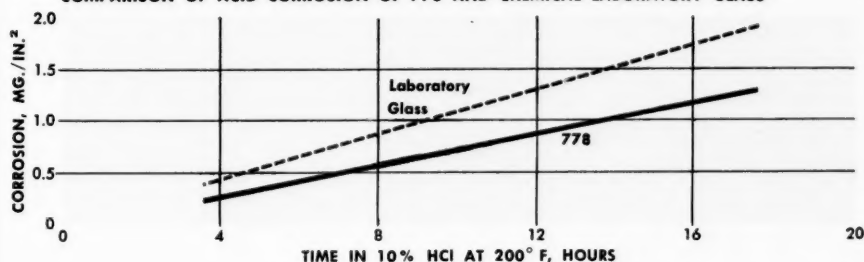
# glass-lined chemical processing equipment

More corrosion and thermal shock resistant than chemical laboratory glass

**MORE ACID-RESISTANT** Ever think you'd see the day when glass-lined steel possessed the acid-resistance of boro-silicate type lab glass? Glascote put new 778 and lab glass to rigid

quantitative acid tests — the results proved Glascote 778 not only equal but *superior* to lab glass in its ability to withstand acid corrosion.

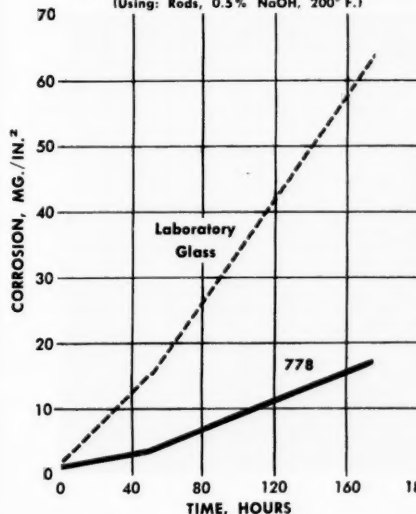
COMPARISON OF ACID CORROSION OF 778 AND CHEMICAL LABORATORY GLASS



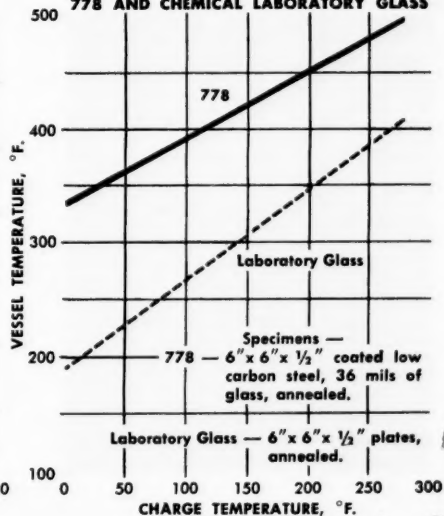
**MORE ALKALI-RESISTANT** Glascote 778's superior acid resistance was achieved without sacrificing any other protective property. Actually, as an alkali-resistant glass, its superiority over boro-silicate type laboratory glass is even more dramatic.

**MORE THERMAL SHOCK-RESISTANT** We gave Glascote 778 and untempered boro-silicate type laboratory glass shock treatment too! Heating and quenching tests show Glascote 778 able to resist thermal shock at higher temperatures. However, for applications requiring *even higher* resistance to thermal shock, we've formulated Glascote 558 — a special anti-thermal shock glass.

COMPARISON OF ALKALI CORROSION OF 778 AND CHEMICAL LABORATORY GLASS  
(Using: Rods, 0.5% NaOH, 200° F.)

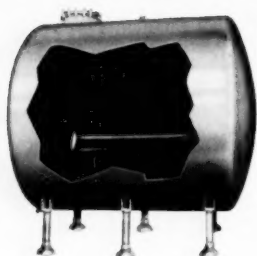


COMPARISON OF THERMAL SHOCK LIMITS OF 778 AND CHEMICAL LABORATORY GLASS



For more information on Glascote's equipment line, please turn page





**GLASS-LINED STORAGE TANKS** — Single shell horizontal types and vertical units available. Plain, jacketed, open and closed. Built to your specifications.



**GLASS-LINED HEAT EXCHANGER TUBES** — Easily assembled into corrosion-resistant heat exchangers. Standard diameter jacketed pipe, combines with elbows or return bends.



**GLASS-LINED PIPE AND FITTINGS** — Available in 10-ft. lengths, fittings to ASME standards, in inside diameters from 1½ to 4 in. Six and eight inch and larger sizes to order.

## THESE GLASS-LINED PRODUCTS FOR THE CHEMICAL PROCESSING INDUSTRIES ARE ALL AVAILABLE WITH

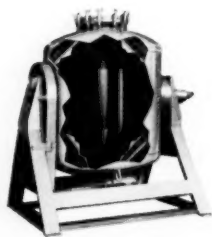
# Glascote®



**GLASS-LINED REACTORS** — Custom-built up to 8,000 gallons. Standard units from 300- to 2000-gallon capacities. Feature rotary mechanical seal eliminating contamination from packed stuffing boxes . . . removable blade glass-coated agitators.



**GLASS-LINED COLUMNS** — Standard and special packed units in glass-on-steel or alloy metals. Built to your specifications in dia. up to 60 in.



**GLASS-LINED CONICAL, ROTARY DRYER-BLENDEES** — Capacities 5, 35 and 110 cu. ft. as standard, and larger on request. Pressures: tank full vacuum to 25 psi, jacket 65-75 psi.

Glascote offers you reactors (including high pressure spherical production-size types), columns, storage tanks, rotary dryer-blenders, pipe and fittings — all available glass-lined with Glascote 778 for the best protection ever put to steel.

Glascote 778 is the newest addition to an inventory of more than 3,000 glass formulas developed by Glascote and its parent organization, A. O. Smith Corporation. For example, on those specific applications where a producer has a consistent thermal shock problem, Glascote 558 was formulated to give no-spall performance over an indefinite period of time. And this same Glascote 558 is also industry's most abrasion- and mechanical impact-resistant glass.

The equipment shown on this page is typical of many products supplied for laboratory, pilot plant and full scale commercial production, engineered and fabricated to your exacting specifications.

Ask the representative who calls on you for all the facts on Glascote products. Or if you prefer, write direct: Glascote Products, Inc., Cleveland 17, Ohio.

# Glascote®

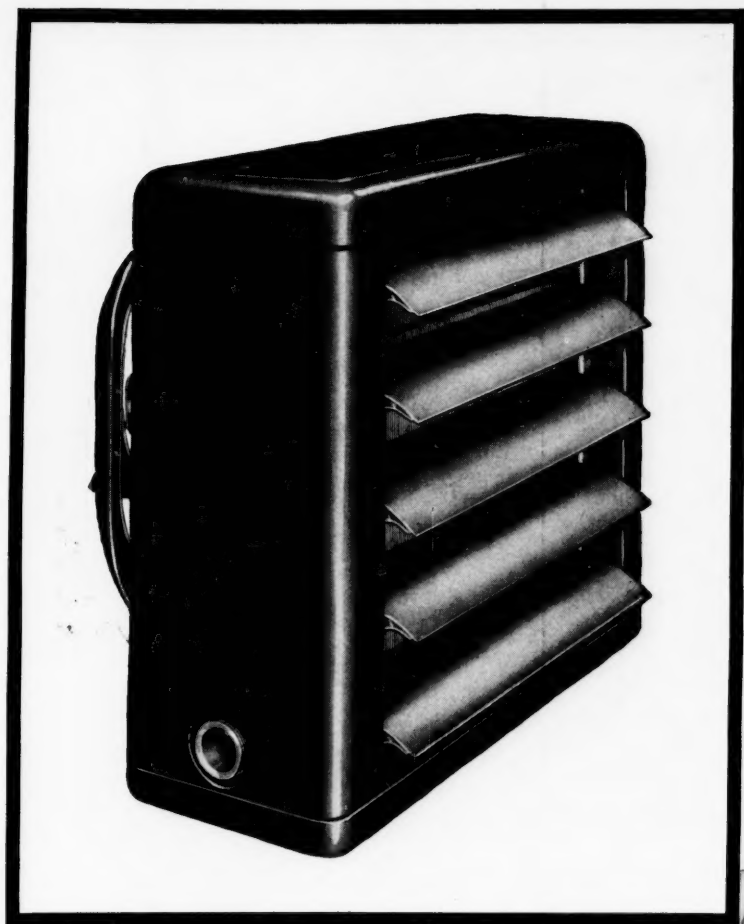
PRODUCTS, INC.

CLEVELAND 17, OHIO

Sales offices or agents in principal cities. Export Sales:  
A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U. S. A.

A SUBSIDIARY OF A. O. SMITH CORPORATION • World's largest manufacturer of glass-protected steel products

Litho in U. S. A. MG



**Easy to Install!**

**Leak-Proof!**

**Economical!**

**Maintenance-Free!**

**Highly Efficient!**

**Ideal for  
High-Pressure  
"Spot-Heating"  
Installations!**

## **"BUFFALO" BREEZO-FIN UNIT HEATERS**

"Buffalo" Breezo-Fin Unit Heaters are your "best buy" for "spot-heating" applications in plants and commercial buildings. Flexible, economical and dependable, they are delivering peak performance in thousands of installations throughout the world.

Best of all, *leakage inside the unit is positively eliminated*. A one-piece, seamless copper tube extends from inlet to outlet ground joint. This provides absolutely leak-tight operation for steam pressures up to 250 pounds and 406°F. Special coils for higher pressures and temperatures can be furnished, on application, utilizing steam or hot water.

Other Breezo-Fin features include high-efficiency fans for quiet operation — streamlined, handsome appearance — fins designed for maximum radiation — sturdy construction for long, maintenance-free life — adjustable louvers to "spot" the heat exactly where it's needed. Available in 31 standard sizes from 16,000 to 497,000 BTU. Special larger packages also available for higher heating loads.

Be sure to investigate "Buffalo" Breezo-Fin Unit Heaters for your next "spot-heating" job. Contact your nearby "Buffalo" engineering representative, or write us direct for Bulletin 3137-E.



One of many "Buffalo" Breezo-Fin Unit Heaters installed in world's largest surgical dressings plant, equipped with special coils operating on 425°F hot water with 400 P.S.I. working pressure.

*"Buffalo" products bring you the "Q" Factor—the built-in QUALITY that provides trouble-free satisfaction and long life.*



**BUFFALO FORGE COMPANY**

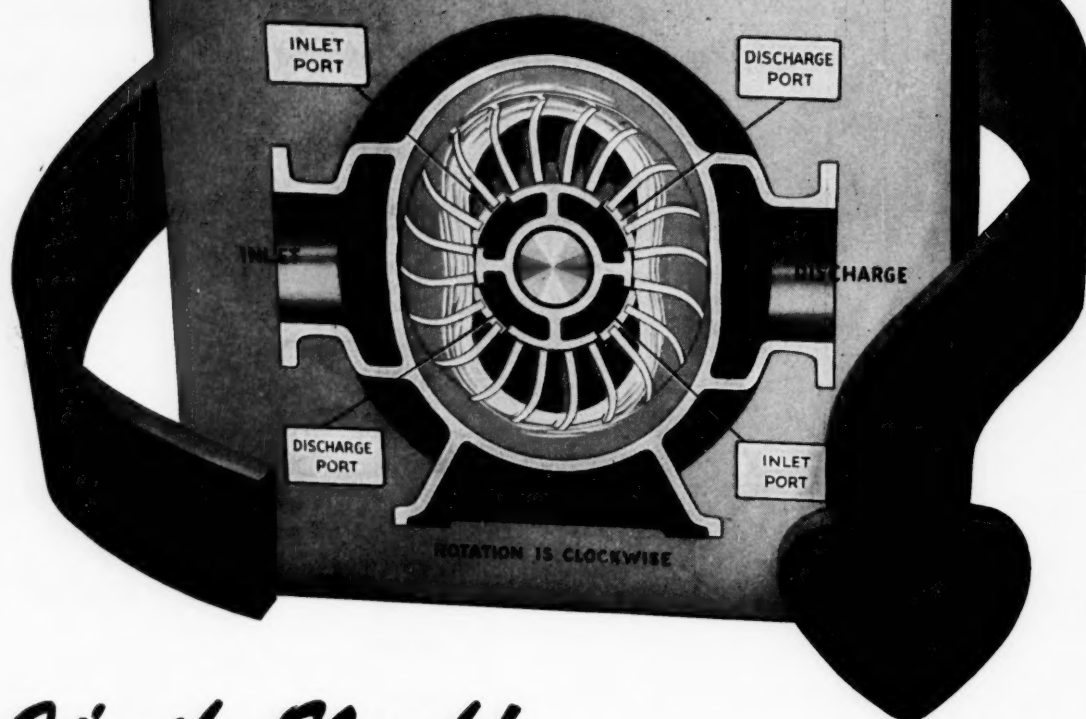
**BUFFALO, NEW YORK**

Buffalo Pumps Division • Buffalo, N.Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

## This is Why the Nash is the Most Simple Compressor



## *It's the Nash!*

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

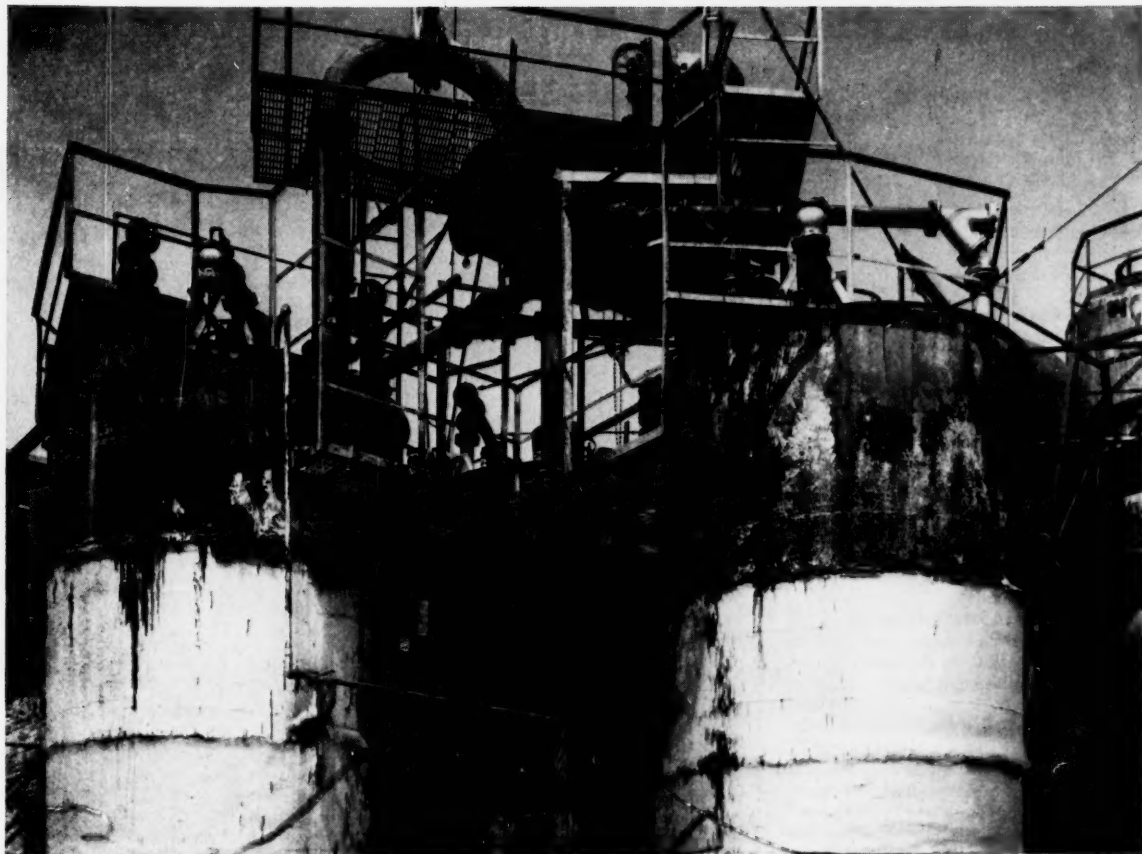
The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request.

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

**NASH ENGINEERING COMPANY**  
**313 WILSON, SO. NORWALK, CONN.**



at **FLINTKOTE'S** Chicago Heights plant:

## 13 years continuous operation prove advantages of **TURBO** asphalt oxidizers

Thirteen years ago three General American **TURBO** asphalt oxidizers were installed at Flintkote Company's Chicago Heights plant. The units were piped to operate either individually as batch oxidizers for special products or in series for asphalt blowing. They require less than 15 hp each, and each is capable of handling up to 1000 cfm of air. They afford a rise in the melting point of asphalt material, varying from 12 to 20 degrees per hour, depending on the type of flux being produced.

For thirteen years the units have been in continuous operation, providing advantages of low power consumption, high air efficiency and accurate control of product specification.

The Flintkote installation is typical of **TURBO** asphalt equipment installed during a 25 year period to give higher production rates per still, lower power costs and less down time. **TURBO** units are safer to operate, need less top steam and less firing because of greater heat generation in the asphalt.

Ask for a **TURBO** engineer to discuss application of **TURBO** equipment to your needs.

See us at the **CHEM. SHOW**  
Nov. 30-Dec. 4  
Booths 435-6, 442, 446, 495

**FOR DETAILED INFORMATION AND USEFUL DESIGN DATA, SEND FOR THE FOLLOWING BULLETINS:**

Please send me the following Turbo-Mixer Bulletin (s):

General Turbo-Mixer Bulletin\_\_\_\_\_

RDC Extraction Column Bulletin\_\_\_\_\_

Process Equipment Division

**TURBO-MIXERS**

**GENERAL AMERICAN  
TRANSPORTATION  
CORPORATION**

135 South LaSalle Street  
Chicago 3, Illinois • Offices in principal cities



# Why the simplest trapping method is also the most economical

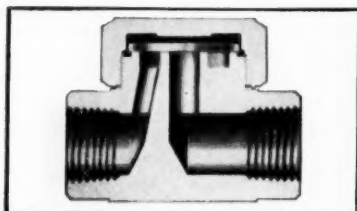
by John W. Ritter, Test Engineer  
SARCO Company, Inc.

The function of all steam traps is to release condensate and prevent steam loss. However, the method of trapping can make a great difference in cost and effectiveness.

In the Sarco Thermo-Dynamic® Steam Trap, the method is fundamental. Air or condensate entering the trap must flow from the inlet tube, radially across the underside of the disc valve, to the outlet. The space between the inlet tube and the disc forms a nozzle in which the static pressure energy of the incoming fluid is partly changed to velocity across the underside of the disc, with a resultant decrease of pressure. (This will be recognized, of course, as the Bernoulli Principle.) Use of this fundamental method means reliability in operation.

As the high-velocity fluid jet strikes the side of the upper chamber, some recompression takes place, so that the pressure above the disc becomes greater than the pressure below it. The pressure reduction under the disc and the pressure recovery above it depend on the internal energy of the fluid. As the condensate above nearly approaches steam temperature, its internal energy is enough to overcome the upward force at the inlet tube, and the disc snaps down in the inlet tube, which is the inlet valve seat.

Simultaneously, the disc also seals the outer ring, which isolates the space above the disc from the outlet. The disc valve is therefore held firmly against the inlet valve seat until the pressure in the control chamber is reduced by condensation. The upward force then exceeds the downward force and the disc valve opens.



This 3-part Sarco TD-50 Steam Trap has only one moving part — the hardened, polished stainless steel disc.

No other trap uses the velocity of the fluid to operate the valve or the recompression of the flowing fluid to trap the valve closed and to hold it closed. When it closes, it closes tightly — no "operating steam" leaks out.



This tracer line manifold at the Armour Chemical plant at McCook, Illinois, is drained by eleven Sarco TD-50 Steam Traps.

## Test installation led to selection of SARCO TD-50 Steam Traps at Armour's McCook Plant

Test installations of Sarco Thermo-Dynamic® Steam Traps at the McCook, Illinois, plant of the Armour Chemical Division showed satisfactory performance on all requirements specified by the plant engineers. The TD-50's discharged condensate as fast as it formed, without wasting live steam. TD's inline construction made installation easy, even in tight quarters. Maintenance was practically negligible, and no adjustment was necessary for varying steam pressures. In the plant, steam pressure of different processes ranges from 15 to 160 psi. Armour's McCook plant began to install TD-50 Steam Traps in 1956 and continued to add them as the plant expanded. By the third quarter of 1958, there were 309 TD-50's in use there.

Write for your "Literature Kit 2A" today and get latest bulletins on the TD-50 Steam Trap and other Sarco traps. Sarco can give you impartial advice on *Production Planned* steam trapping because ...

7961-B

# SARCO

COMPANY, INC.

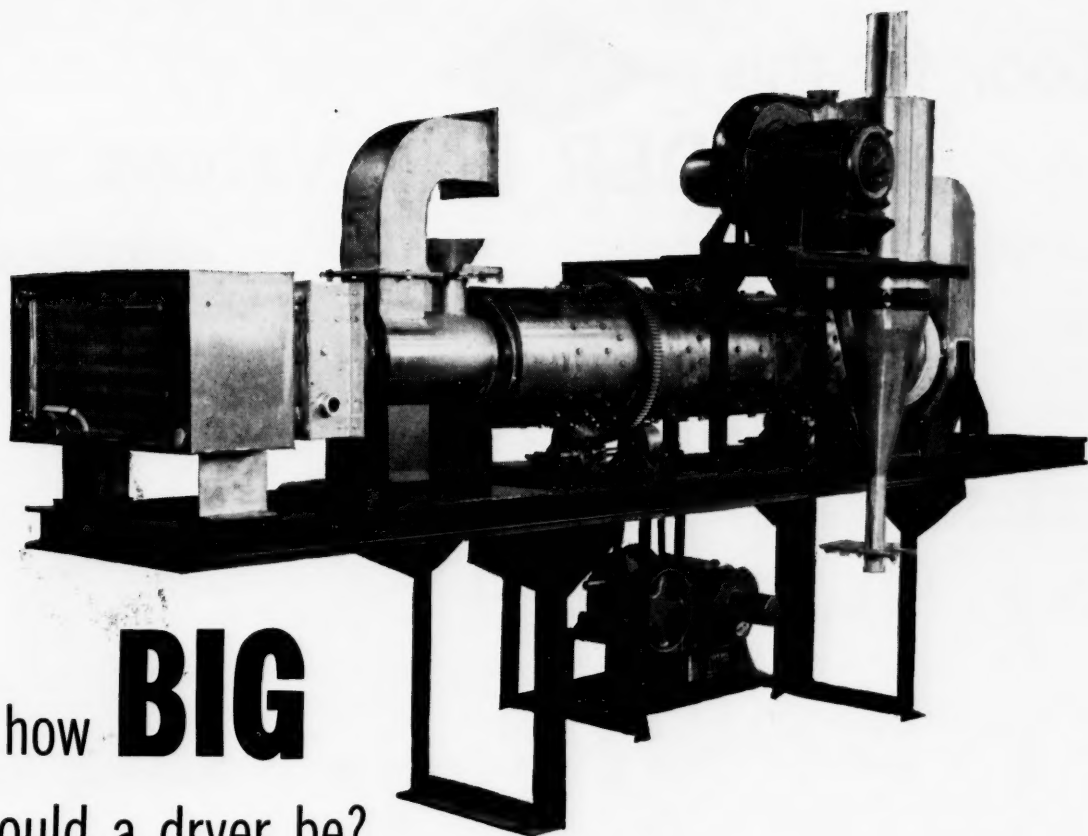
635 Madison Ave., New York 22, N. Y.

Only Sarco makes all 5 types:  
Thermo-Dynamic • Thermostatic • Liquid Expansion  
Float Thermostatic • Bucket

\*U. S. Pat. No. 2,817,353 T.M. Reg. U. S. Pat. Off.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES





how **BIG**  
should a dryer be?

*"Baby" Louisville Dryers do a man-sized production job for chemical and pharmaceutical firms*

Producers of pharmaceuticals and fine chemicals who buy or rent pilot-size Louisville dryers for on-site pre-production testing often find that the equipment produces sufficient quantities of processed material to supply the market!

Louisville Dryer engineers, utilizing our complete testing laboratory facilities assure you of getting the dryer type and

size ideally suited to your needs. Every Louisville Dryer—large or small—is designed to fit the job and to give years of satisfactory performance at minimum cost.

Let Louisville's 61 years of drying experience work for you. A Louisville engineer is always available to help you with your drying problems, anywhere in the country. No obligation for this service, of course.

See us at the CHEM. SHOW  
Nov. 30-Dec. 4  
Booths 435-6, 442, 446, 495

Process Equipment Division  
**GENERAL AMERICAN TRANSPORTATION**

135 South LaSalle Street • Chicago 90, Illinois  
Offices in principal cities



Louisville Dryers  
**CORPORATION**

Look for this...

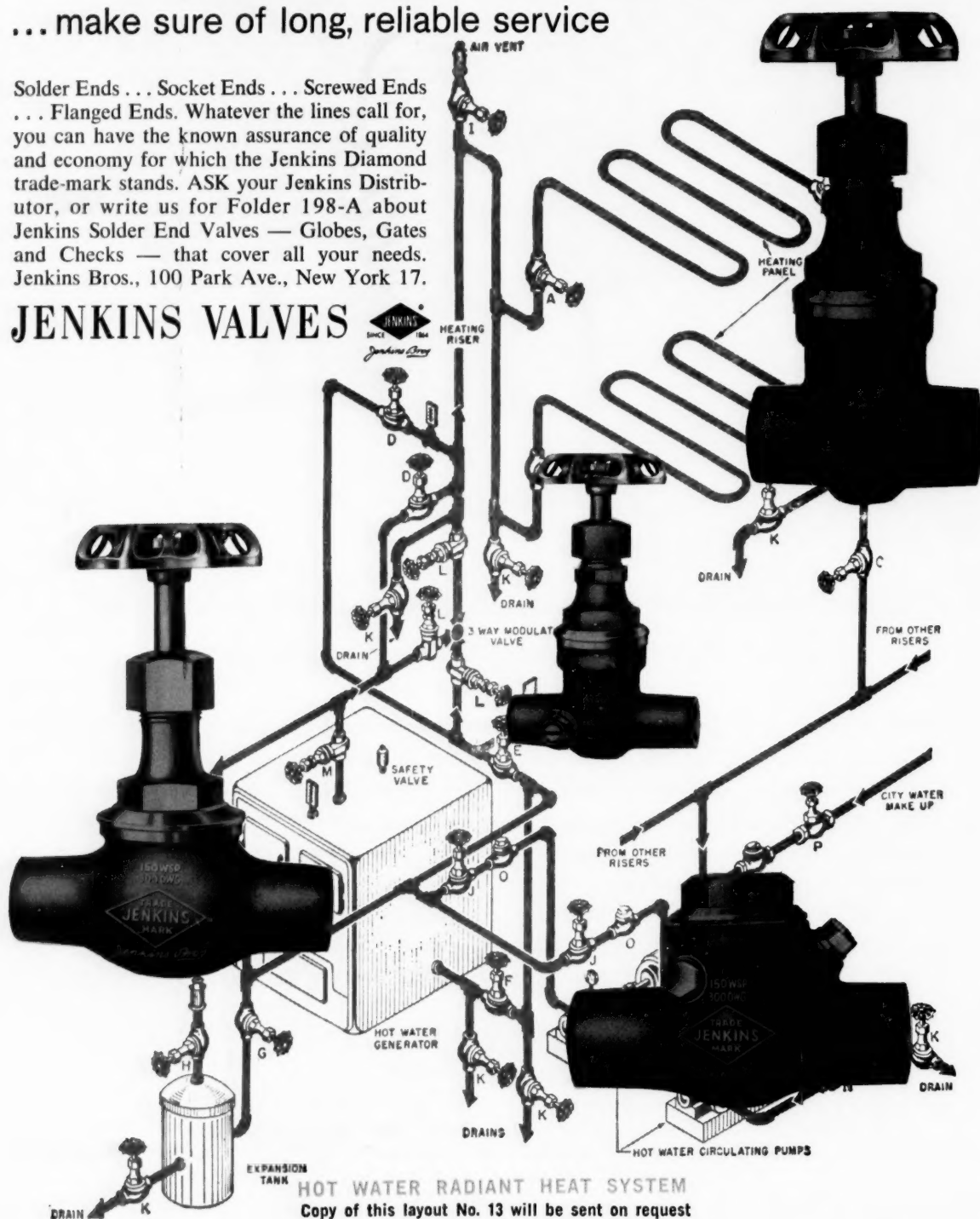
**JENKINS**

on **SOLDER END Valves**, too

...make sure of long, reliable service

Solder Ends . . . Socket Ends . . . Screwed Ends . . . Flanged Ends. Whatever the lines call for, you can have the known assurance of quality and economy for which the Jenkins Diamond trade-mark stands. ASK your Jenkins Distributor, or write us for Folder 198-A about Jenkins Solder End Valves — Globes, Gates and Checks — that cover all your needs. Jenkins Bros., 100 Park Ave., New York 17.

**JENKINS VALVES**



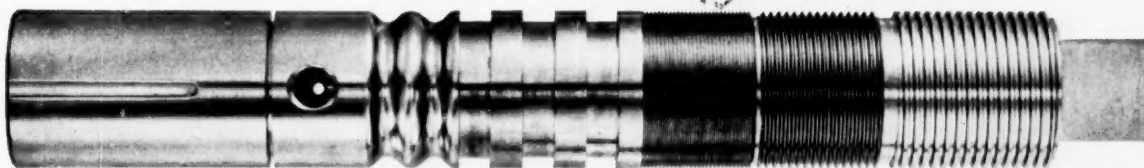
HOT WATER RADIANT HEAT SYSTEM

Copy of this layout No. 13 will be sent on request

# THEY LAUGHED WHEN WE SAT DOWN TO PLATE...



*they didn't know about* **KANIGEN®**



This shaft was turned. It was key-slotted, drilled, tapped and shouldered. It was threaded, milled, grooved and chamfered. It was step-bored, with three inside diameters. Who could plate a piece like this all over—inside and out—and expect a uniform coating?

Well, anyone who used KANIGEN® could expect it—and get it. In fact, we made this piece especially to prove it.

The KANIGEN® process for chemical nickel alloy plating produces a uniform thickness of coating, re-

gardless of the contours of a part. This uniformity permits full machining operations prior to coating, with no subsequent cleanup.

KANIGEN® offers corrosion resistance equal or superior to that provided by wrought or electrolytic nickel.

For complete technical details write or call your nearest General American office. Ask for Kanigen Bulletin No. 258. You'll find that with plating as in so many other industrial areas, *it pays to plan with General American.*

See us at the **CHEM. SHOW Nov. 30-Dec. 4**  
Booths 435-6, 442, 446, 495

**GENERAL AMERICAN TRANSPORTATION CORPORATION**

135 South LaSalle Street • Chicago 3, Illinois

Offices in principal cities

Kanigen Division



# Minimize Liquid Handling Costs with...

## AURORA® PUMPS

Transfer, circulation, or pressure boosting of liquids — hot or cold — is accomplished with the highest degree of efficiency. Since less power is needed to provide required delivery, initial costs are less and operating costs are lower. Aurora Centrifugal and Apco Turbine Type Pumps are available in a broad range of types and sizes to various capacity and head requirements.

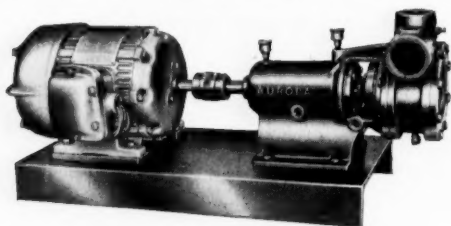
**UP-TO-THE-MINUTE ENGINEERING** . . . many pump sizes have been added to accommodate a broader range of services . . . with new features such as center-line discharge for self-venting . . . vertical foot mountings for split case pumps to minimize space requirements . . . suction spools to permit easiest disassembly for checking and maintenance . . . low NPSH . . . stainless steel impeller shafts for longer life . . . and application of newest alloy materials for special conditions.

**SIMPLICITY OF DESIGN** . . . provides clean-cut lines, compactness, light weight, high efficiency, and easy installation.

**DEPENDABLE PERFORMANCE** . . . is assured with the rugged construction, precision machining, and high quality materials.

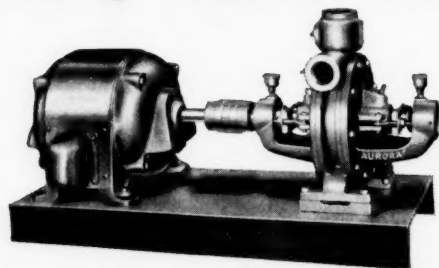
**EASY MAINTENANCE** . . . because complete disassembly and reassembly can be accomplished without breaking the piping connections or the motor-pump alignment.

**COMPLETE CONFIDENCE** . . . is merited by the top performance and long service life of the many Aurora installations in the chemical industry.

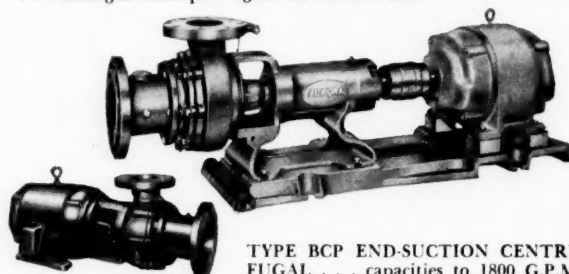


**APCO Z-4 CHEMICAL PROCESS PUMPS** . . . capacities to 50 G.P.M. . . . heads to 400 P.S.I. . . . maximum speed 3500 RPM . . . available in all alloys . . . double suction design for perfect hydraulic balance . . . multi-vane turbine impeller with steep characteristics for highest efficiency and no vapor locks . . . low NPSH . . . oversize stainless steel impeller shaft and bearing . . . overhung impeller . . . single mechanical seal design . . . balanced radial loads in two stage pumps with 180° cross-over from first to second stage impeller. Ideally suited for handling liquified petroleum gases, refrigerants, or light non viscous liquids. Freon • Butane • Hexane • Carbon Tetrachloride • Ammonia • Genetron • Propane • Toluene • Trichlorethylene • Carbon Dioxide.

WRITE FOR COMPLETE  
INFORMATION — OR CALL  
YOUR LOCAL AURORA  
DISTRIBUTOR

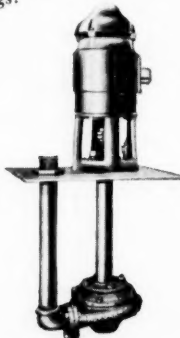


**APCO 4, 5, and 6 Series Turbine Type** . . . capacities to 150 G.P.M. . . . Heads to 300 P.S.I. . . . 1750 R.P.M. . . . center-hung, multi-vane turbine impeller with steep characteristics for highest efficiency and no vapor lock . . . removable channel rings for maximum economy . . . removable end covers which permit complete disassembly without disturbing the piping connections . . . center-line vertical discharge for self venting . . . double suction design for perfect hydraulic balance . . . no metal-to-metal contact within the pump channel minimizes wear . . . interchangeability of impellers and channel rings within the series provides maximum capacity flexibility . . . constant capacity over wide variation in head fluctuations . . . balanced radial loads maintained in two stage pumps by 180° cross-over from first to second stage impeller . . . arranged with packing or mechanical seals.



**TYPE BCH CLOSE-COUPLED END-SUCTION CENTRIFUGAL** . . . same capacities, heads, and features as BCP Pumps . . . with close-coupled design for maximum compactness . . . also available in vertical flange or base mountings.

**TYPE BCP END-SUCTION CENTRIFUGAL** . . . capacities to 1800 G.P.M. . . . Heads to 320 ft. . . . with unique suction spool arrangement permits disassembly without disturbing the discharge connection, pump-motor alignment, or foundation bolts . . . vertical discharge makes pump self venting, avoids vapor locks and permits smooth running operation with controlled noise level . . . low NPSH . . . interchangeability between packing and mechanical seals . . . low impeller velocities and steep sloping characteristics with constantly rising head to shut-off.



**TYPE NSA VERTICAL SUMP PUMPS** . . . capacities to 1500 GPM . . . Heads to 170 ft. . . . design ideal for handling heavy, viscous or high temperature liquids . . . special alloys for handling corrosive liquids . . . impellers with stream-line design for maximum flow with minimum power consumption . . . designed for submerged installations.

**AURORA PUMP DIVISION**  
THE NEW YORK AIR BRAKE COMPANY

670 LOUCKS STREET

AURORA, ILLINOIS



LOCAL DISTRIBUTOR IS LISTED IN THE YELLOW PAGES OF YOUR PHONE BOOK

SEE THE TRAYLOR DISPLAY AT THE CHEM SHOW—BOOTH NO. 495

Just one of the reasons why . . . . . *Traylor*-engineered  
***Traylor-made***  
**KILNS**  
 can do a better job for you!

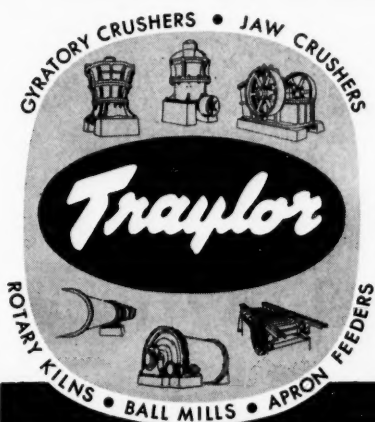


Thrust roller mechanism of an 8'-6" dia. to 7'-10" dia. x 400'-0" Traylor Rotary Kiln.

*Traylor*-engineered  
**ROLLER SUPPORTS**



THRUST ROLLER MECHANISM WITH TWO BEARINGS SUPPORTING THE ROLLER TIED TOGETHER SO THAT A RIGID MOUNTING IS OBTAINED.



The outstanding roller support insures easy alignment, continuous operation and low maintenance of kilns. Traylor Rotary Kilns have all welded steel shells, feed and discharge end seals, heat recuperating chain systems for wet process kilns, improved kiln feeders, drives and many other reasons why a Traylor Kiln can do your job better. Write for Bulletin No. 1115 today.

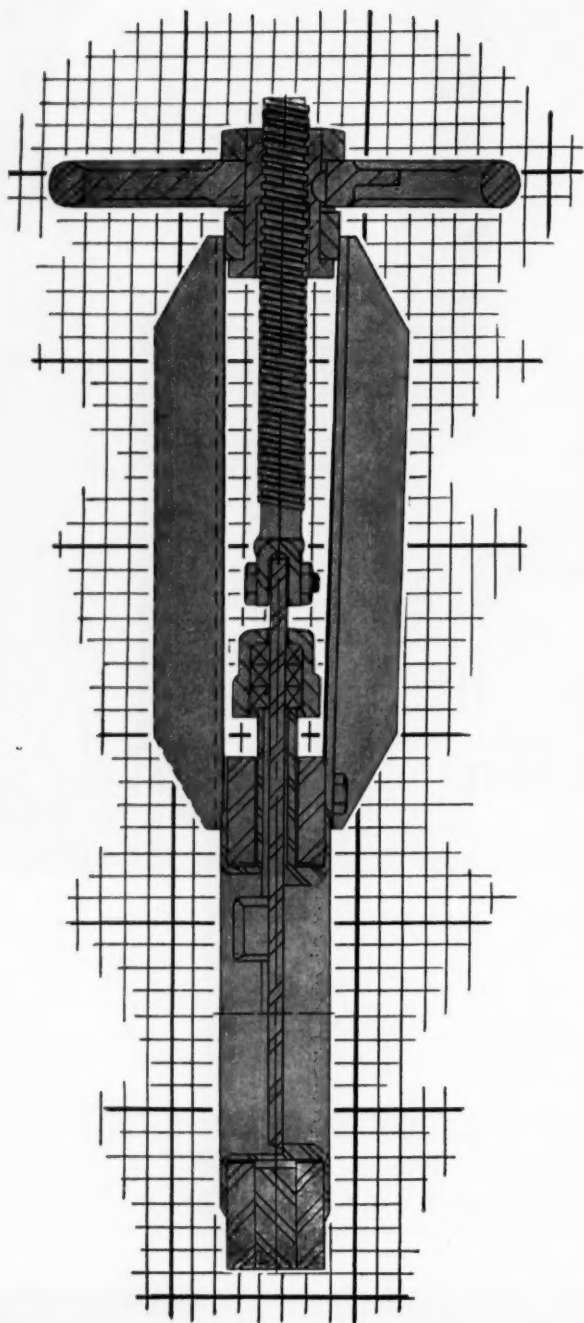
**ENGINEERING & MFG. DIVISION OF FULLER CO.**  
 1300 MILL ST., ALLENTOWN, PA.

Sales Offices: New York — Chicago — San Francisco  
 Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P.Q.





# The LOW COST of Valving...



The processing of corrosive chemicals — the handling of acid or alkaline services—has always required expensive valves . . . until now!

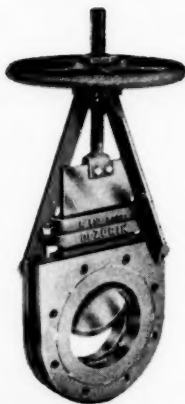
But now . . . ! DeZurik Fabricated Knife Gate Valves have *high* resistance to corrosion at a low, low cost.

Only the parts coming in contact with the flow utilize high alloys. The remaining structural portions of the valve are produced in mild steel or in other economical metals. (Fabricating out of plate material also eliminates the porosity of cast metal valves.)

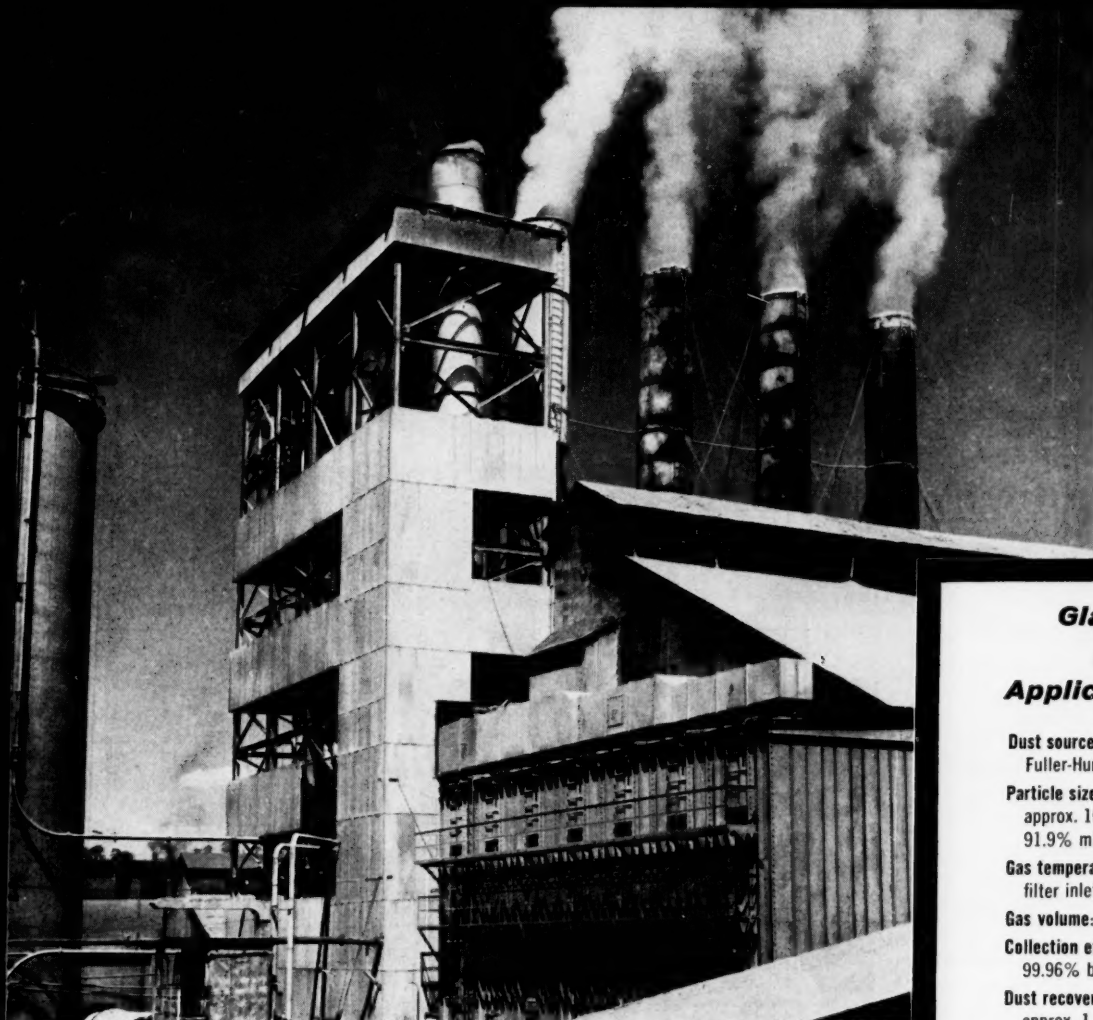
Their light weight drastically reduces installation costs and their bonnetless design all but eliminates maintenance expense. Yet their rugged construction withstands piping strains and line pressure.

They're available in a wide range of metal combinations and in several different styles. A full complement of operators is also available.

For more information, see the DeZurik representative in your area . . . or write for Bulletin 300.



**DeZURIK**  
CORPORATION  
SARTELL, MINNESOTA



## Dracco Glass-Bag Filter stops air pollution

The unretouched photograph shows the kiln stacks at an eastern cement plant. *All five kilns are operating!* One stack is clean because a Dracco Glass-Bag Filter is removing all visible dust from the hot kiln exhaust gas.

Results like this have made Dracco Glass-Bag Filters industry's most effective weapon against air pollution.

### New performance standard

Previously the hot kiln gases would have made this an "impossible" job for a cloth bag collector. But fiber glass cloth filters, pioneered by

Dracco, can collect hot, corrosive dust and fumes to 600° F. at virtually 100% efficiency.

This radically better dust collector is now available to solve the toughest air pollution problems: cement kilns, calciners, metallurgical furnaces, power boilers, chemical processes, cupolas, steam micronizers, carbon black production.

### Exclusive advanced design

Dracco Glass-Bag Filters are engineered systems of modular design which operate automatically and incorporate exclusive means of clean-

ing filter bags. The patented SONOCLEAN unit utilizes sonics to remove all dust without cloth wear or fracture. Alternately, for light flocculent dust, the patented SWING-CLEAN mechanism uses gentle motion to dislodge difficult dusts. Both SONOCLEAN and SWING-CLEAN assure long bag life which in some cases has exceeded two years.

For further information on Glass-Bag Filters, today's most advanced equipment for air pollution or hot dust problems, contact: Dracco Division of Fuller Co., Harvard Ave. and East 116th Street, Cleveland 5, Ohio.

### Glass-Bag Filter

#### Application Data:

**Dust source:** cement kiln with Fuller-Humbolt preheater

**Particle size:**  
approx. 100% minus 10 microns  
91.9% minus 5 microns

**Gas temperature:**  
filter inlet: 570-600° F.

**Gas volume:** 42,000 cfm

**Collection efficiency:**  
99.96% by weight

**Dust recovery rate:**  
approx. 1 ton/hour

**Filter size:** 7 compartments,  
48 fiber glass bags  
per compartment

**Bag cleaning method:**  
SONOCLEAN

**DRACCO** airstream conveyors  
dust control equipment



**Now...  
Hammel-Dahl  
offers  
4 split body  
valve types..  
14 interchangeable  
actuators**

*...the first complete line of split body valves with interchangeable pneumatic, electric, electro-hydraulic and manual actuators.*

And you get more capacity in these advanced split body designs. A variety of interchangeable actuators provide optimum flow control under any conditions. Standardization reduces engineering and maintenance costs too. Check your classified directory for your local Hammel-Dahl representative or General Controls Factory Branch Office. Or write for a new brochure on the split body line.

**Specifications**

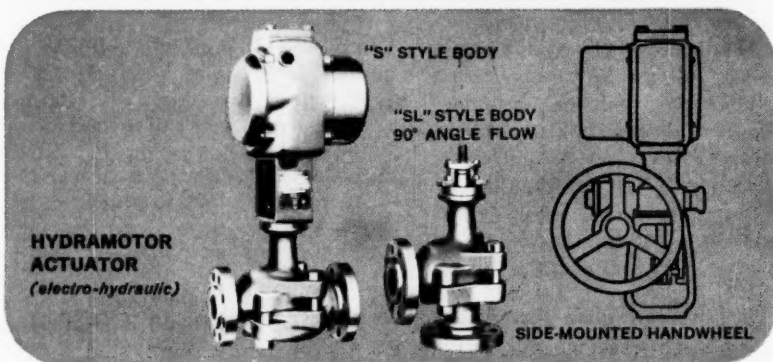
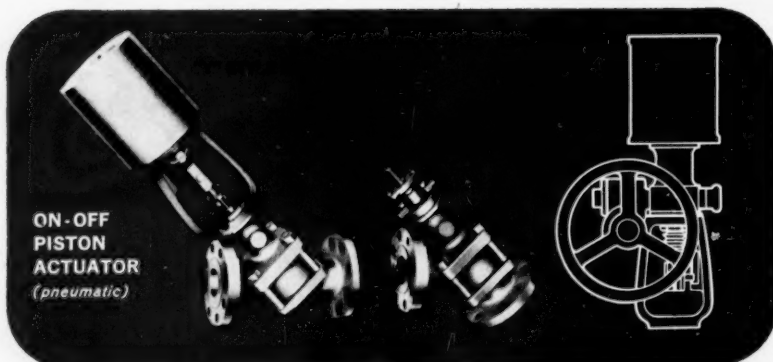
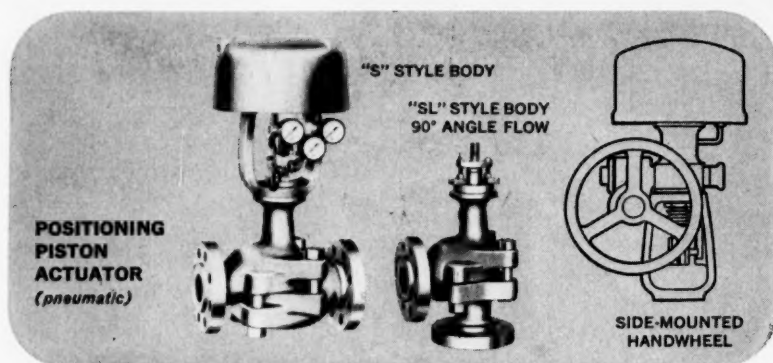
**Sizes:** ½" - 8"

**Connections:** 150 to 1,500 lb. ASA flanged. Screwed or welding ends through 2". Separable or integral flanges.

**Bodies:** Carbon steel, 316 SST, nodular iron, bronze or any castable alloy.

**Trim:** Materials and characteristics as specified.

**Face-to-Face:** I.S.A. Standard — all sizes on "S" and "SL" bodies — through 4" size on "Y" and "YL" bodies. Non-standard face-to-face also available.



Manufacturers of Control Valves and Allied Equipment

HAMMEL-DAHL DIVISION

**GENERAL CONTROLS**

WARWICK INDUSTRIAL PARK, WARWICK, RHODE ISLAND

REPRESENTATIVES IN PRINCIPAL CITIES OF UNITED STATES, CANADA AND EUROPE



Fuller Airveyor unloads wood flour to two forty-five foot silos. Second Airveyor system reclaims material 360 feet to processing.

## General Electric Changes From Bags to Airveyor ... Cuts Handling Costs 60%

As part of a program to increase plastics production and reduce operating costs at its Pittsfield, Mass. plant, General Electric Company called in Fuller engineers to design systems for handling wood flour in bulk.

Wood flour—used as a filler in phenolic molding compounds—was being handled in 75 and 100-pound bags. Unloading one carload of bags required 16 manhours. Bags were loaded on dollies and wheeled to a distant elevator.

**SAFETY FIRST**—The two pneumatic Airveyor® materials handling systems, engineered and manufactured by Fuller Company, were installed by its parent company, General American Transportation Corp., providing undivided responsibility. This installation resulted in a 60% saving in handling costs! The two systems

are handled by one full-time and one part-time operator. Manhours to unload one car have been reduced from sixteen to six!

In addition, all equipment is designed to conform to strict safety specifications set down by G-E engineers.

**FLOW YOUR MATERIALS**—The Airveyor is a system that flows your material through sealed pipes. It's fast, safe, and self-contained. The pipes can be placed close to ceilings, run underground or through walls.

Whether you process wood flour—or other dry granular materials—look into the many economies of Airveyor conveying. Write today for interesting, detailed literature on Airveyor and other Fuller pneumatic materials handling systems.



# Fuller

Pioneers in harnessing AIR

G-196  
1304

"See Chemical Engineering Catalog for details and specifications".

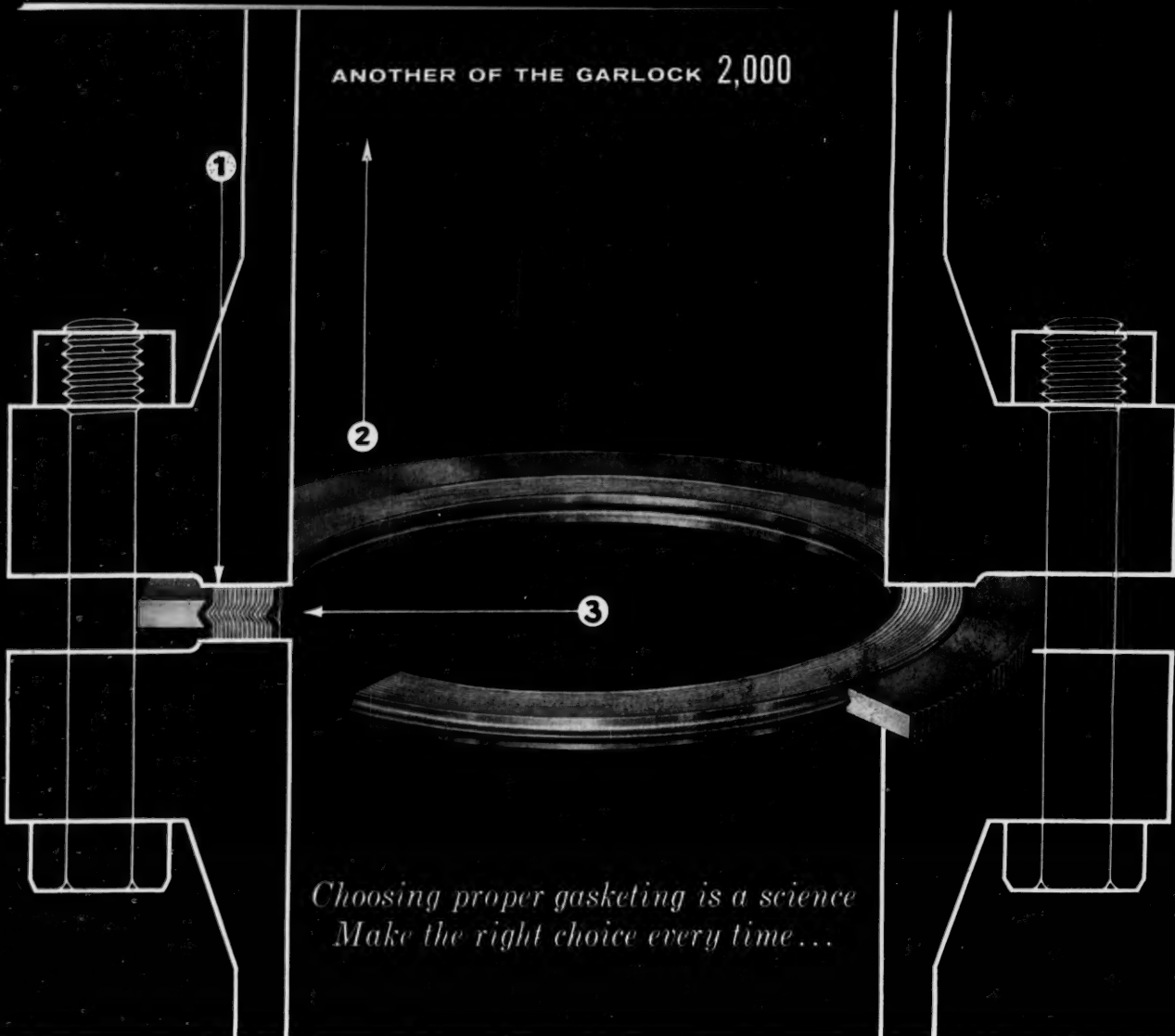
CHEMICAL ENGINEERING—November 16, 1959

**FULLER COMPANY**  
134 Bridge St., Catasauqua, Pa.

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION  
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle



ANOTHER OF THE GARLOCK 2,000



*Choosing proper gasketing is a science  
Make the right choice every time...*

## SELECT GARLOCK GUARDIAN\* GASKETS FOR EXTREME TEMPERATURES, PRESSURES

**Expertly-engineered** GUARDIAN gaskets provide the necessary resilience and flow required by:

1. **BOLT LOAD** . . . seating force needed to make the gasket flow into the flange face imperfections to maintain tight seal against internal pressure
2. **HYDROSTATIC END FORCE** . . . pressure applied to a gasketed assembly by confined gases or liquids which tends to separate the flanges
3. **INTERNAL PRESSURE** . . . acts on the portion of a gasket exposed to the pressure side of a joint and tends to by-pass the gasket

**Garlock GUARDIAN Gaskets** are constructed of spiral-wound strips of V-shaped metal alternated with layers of asbestos paper or TEFLON†. By increasing or decreasing the number of layers the compressibility of GUARDIAN gaskets can be changed to meet different pressure and bolt loads—in no other type gasket can this be done!

**Where operating conditions are unusually severe, apply TEFLON Garlock GUARDIAN gaskets to assure safe, positive**

\*Registered Trademark

†DuPont Trademark for TFE Fluorocarbon Resin

Canadian Division: The Garlock Packing Company of Canada Limited  
Plastics Division: United States Gasket Company

sealing against practically all chemicals at temperatures from  $-300^{\circ}\text{F.}$  to  $+450^{\circ}\text{F.}$  For service against oils, steam, gases, liquids, at temperatures as high as  $1050^{\circ}\text{F.}$ , pressures to 2500 psi, use asbestos-filled GUARDIAN Gaskets.

GUARDIAN gaskets are another of the Garlock 2,000 . . . two thousand different styles of packings, gaskets, and seals for every need. The only complete line. Ask your local Garlock representative for his unbiased recommendations. Or, write for Folder AD-104.

**THE GARLOCK PACKING COMPANY, Palmyra, New York**

For prompt service, contact one of our 26 sales offices and warehouses throughout the U. S. and Canada.

# GARLOCK

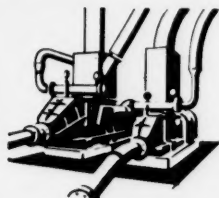
Packings, Gaskets, Oil Seals, Mechanical Seals,  
Molded and Extruded Rubber, Plastic Products





# FULLER EQUIPMENT

## for the process industries

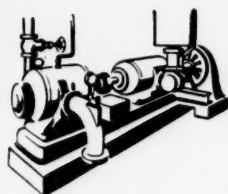


bulk materials pneumatically. Fuller-Kinyon

### Pneumatic Materials Handling Systems.

Widely specified throughout the process industries, Fuller's range of equipment offers best single source for solving problems in moving dry

Pumping Systems, Airveyor® Pressure and Vacuum Conveying Systems, and F-H Airslide® Fluidizing Conveyors are completely sealed to prevent both contamination of the product and any leakage of dust, etc., into the surrounding area. They are used to move dry, granular and pulverized materials to and from cars, ships, trailers, storage and processing points.

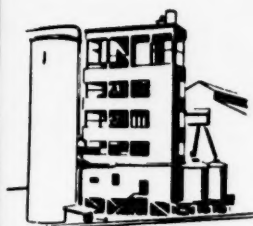
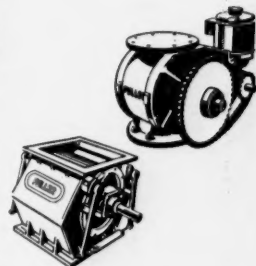


### Fuller Rotary Compressors and Vacuum Pumps

are vibration-free, can be installed anywhere, even on balconies. Fewer moving parts mean minimum maintenance. Compressors and Vacuum Pumps handle air and gases from 30 to 3300 cfm at pressures to 125 lb. gage. Vacuums to 29.95 in. (referred to 30-in. barometer).

### Fuller Vane-type and Roll Feeders . . .

for volumetrically controlled feeding of a wide range of dry pulverized or granular materials. Also Fuller Rotary Valves . . . used under silo deck slabs and bins to permit the free flow of pulverized materials which tend to arch, such as lime and cement raw materials.

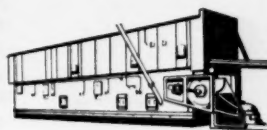


### Fuller Preheaters, Humboldt Suspension Type

. . . for preheating dry, pulverized Portland cement raw materials with rotary kiln waste gases.

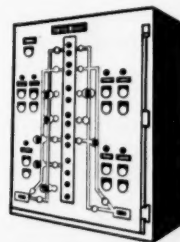
### Fuller Horizontal and Inclined Grate Coolers

are compact, easily installed for fast, efficient cooling of materials such as nodulized phosphate rock, pebble lime, ores, dolomite, iron nodules and Portland cement clinker from 2800°F. or higher to any desired point within a reasonable range of atmospheric temperature.



**Fuller-Material-Level Indicators** signal audibly and visibly when materials reach a predetermined high or low level. Controls conveyor motors, valve circuits, etc.

**Fuller Control Panels** permit automatic, remote, one-man control of multiple operations. Easily-read panel permits visualizing flow of material to storage or from process bins.



Fuller equipment is designed to help give you maximum efficiency at minimum cost.

Send today for more detailed literature.



For details on Fuller Product Line see Chemical Engineering Catalog

### FULLER COMPANY

134 Bridge St., Catasauqua, Pa.

Subsidiary of General American Transportation Corporation

Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

SEE OUR EXHIBIT AT CHEM SHOW NEW YORK COLISEUM NOV. 30-DEC. 4

# Fuller

pioneers in harnessing AIR

1356  
G-210

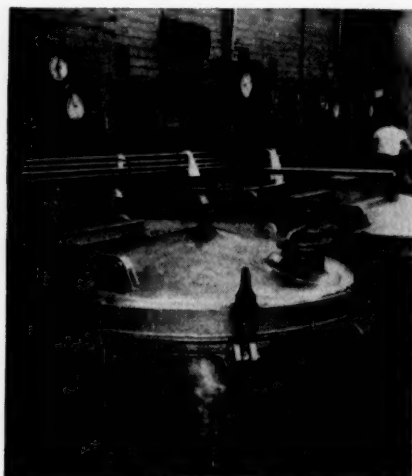
# Down Foam and Up Production



## Job-Proved Dow Corning Silicone Defoamers Save Time, Material, Money

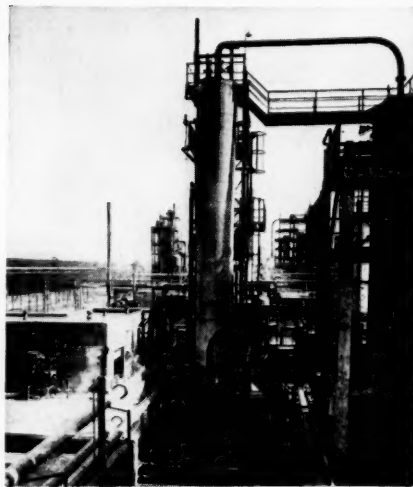
Foam may be fine in a brewery. But in most processing plants, it's a sign of inefficiency. Foam reduces production capacity, slows processing, increases waste — can skyrocket your costs way out of proportion. But why accept foam as a necessary evil when Dow Corning silicone defoamers are so readily available to knock out "bubble trouble" . . . quickly, easily and economically?

Imagine . . . just a few drops of a Dow Corning silicone defoamer is all it takes to control even the most violent and persistent foamers. And these versatile silicone defoamers neither alter nor contaminate products or processes. This permits you to use a Dow Corning defoamer wherever foam is a problem — in textile dyeing, papermaking and sizing; in refining, distilling and gas "scrubbing"; in food processing and packaging; in formulating paints, adhesives, pharmaceuticals . . . you name it.



IN PACKAGE DYEING

No matter what you produce or process, you'll find Dow Corning silicone defoamers are economical; savings and production advantages are multiple. Prove this with your own tests using a generous trial sample that's yours for the asking. In writing for this free sample, please indicate your problem and mention the type of system—oil, aqueous, nonaqueous, food products, or any other. Address Dept. 2623 for a rapid reply.



IN REFINERY GAS SCRUBBING

Your nearest Dow Corning office is the number one source for information and technical service on silicones.



**Dow Corning CORPORATION**  
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

## **Fiber selection and its importance in filtration**

At the very inception of filter fabric design, the key decision that must be made is the selection of the textile fiber or combination of fibers. Both natural and man-made fibers play a major part in filter fabrics.

Each of the many fibers has its own peculiar attributes to fulfill the different filtration requirements.

The natural fiber, cotton, offers the advantages of bulk, plus the high wet strength especially important in filtration. It is a relatively low cost material.

Filter press cloths made of filament yarns such as nylon have a slick, smooth surface for greater ease in cake discharge. Nylon also has excellent caustic resistance and outstanding physical properties.

Acrylic fibers have a high degree of acid resistance, good strength, and resistance to other chemicals and destructive organisms such as mildew and bacteria.

The characteristics of these and many other fibers are strong considerations in making the proper choice. All their properties, however, do not necessarily carry over automatically into the finished fabric. Fabric performance, regardless of fiber, is finally determined by the actual construction of the cloth.

To get complete information about filter fabrics, make sure you consult a specialist. The specialists who distribute Wellington Sears filter fabrics are fully equipped to help you select the medium that best answers your problems. Behind them, they have our 114 years of experience in providing quality fabrics to industry. For distributors' names, and a handy information booklet, write Dept. L-11.



### **Wellington Sears Company**

#### **FIRST In Fabrics For Industry**

Wellington Sears Company, 111 West 40th Street, New York 18, N. Y.  
Akron • Atlanta • Boston • Chicago • Dallas • Detroit • Los Angeles  
Philadelphia • San Francisco

**NEW!**

## **W-K-M's** *Pressure Sealing* **GATE VALVE**

# **THIS BOLD ADVANCE IN VALVE DESIGN**

*Assures:*

- **Positive Seal**
- **Efficient Operation**
- **Superior Performance**

**Floating Seats Give Perfect Seal.** Each seat in W-K-M's *Pressure Sealing Gate Valve* consists of two kinds of rubber, formulated to W-K-M's specifications, molded to a hardened steel insert. There is a full bore opening, the same diameter as the port, through the insert.

Soft rubber, for sealing, is on the back side of each seat. Tougher, abrasive-resistant rubber is on the front or gate side. The steel insert is ringed with holes. Pressure forces the soft rubber through these holes, reinforcing the tough rubber and compensating for any wear.

**Line Pressure Seals the Seats.** In the closed position, the gate forms a primary seal with the raised ring of tough, firm rubber on the face of each seat. As the line pressure is applied to the valve, the gate is forced against the rubber ring on the downstream seat and compresses it until the gate rests against the hardened steel insert. This provides a tight seal between the gate and the rubber on the face of the seat, and a secondary metal-to-metal seal. The action also forces the soft rubber on the back of the seat tightly into its recess and prevents any downstream flow at this point. The result: a bubble-tight downstream seal.

The upstream seal is caused by line pressure forcing its way into the seat recess behind the upstream seat, moving it against the gate. This pressure is sufficient to achieve a positive seal between the gate and

the ring of tough rubber on the face of the seat. At the same time, the raised rim of soft rubber on the back of the seat forms a tight seal with the seat recess.

These double-action floating seats provide tight, positive seals — both upstream and downstream.

**Change Seats in Minutes — On the Line!** You can change the seats in W-K-M's *Pressure Sealing Gate Valve on the line*. The only tools needed are a wrench to loosen the body bolts, and a pair of pliers.

**Important Safety Feature:** This valve has been designed to automatically relieve excessive body pressure caused by thermal expansion. The excess pressure forces the upstream seat away from the gate, allowing it to bleed into the line.

**Additional Advantages:** The full bore, through-conduit gate construction provides a perfectly smooth bore through the valve, eliminating pockets or cavities in which foreign matter might accumulate. Result: perfectly smooth flow with no more turbulence or pressure drop than through an equal length of pipe.

W-K-M's *Pressure Sealing Gate Valve* is a two-way valve and may be installed with the pressure on either side. It is especially well suited for block and bleed service since it seals positively both upstream and downstream. The body may be bled of pressure with the gate in either the fully open or fully closed position.

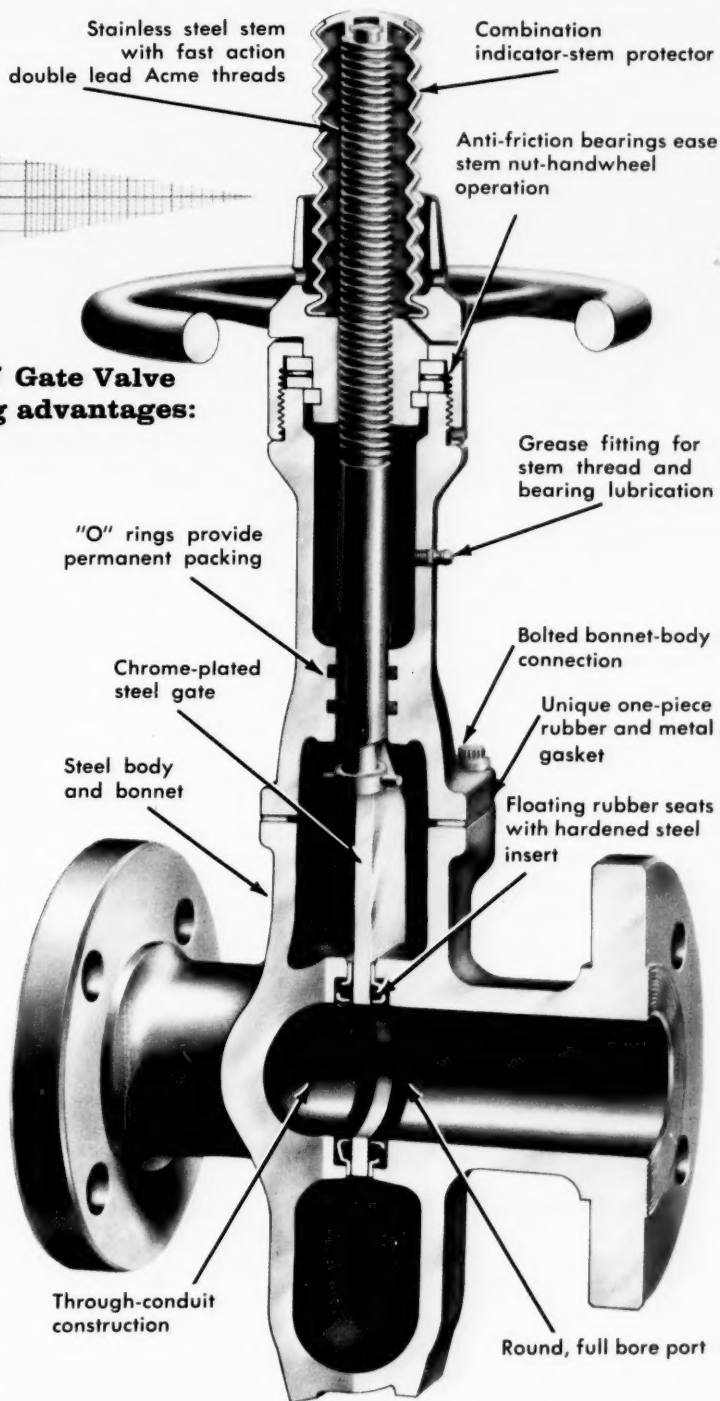
ANOTHER OUTSTANDING PRODUCT OF W-K-M's *Creative Engineering*

**W-K-M's *Pressure Sealing Gate Valve* gives you all these operating advantages:**

- Tight seal both up and downstream in open and closed position
- Full bore, through-conduit
- Seats fully protected from abrasive action of lading
- Non-lubricated
- Seats automatically adjust for wear
- Automatic relief of excessive body pressure
- Ideal for abrasive ladings, light gases, volatile liquids up to 250° F.
- Easy to overhaul on the line

**Tested and Proved in the Toughest Services.** Enthusiastic, completely favorable user reports affirm the superior quality and effortless operation of W-K-M's new *Pressure Sealing Gate Valve*. "Handles all the sludge in a gas blowout line easily — works better than any valve we've used," states a petroleum engineer. A foreman says, "... easiest operating valve I ever saw ... smoothest working valve made." Similar reports covering many other services are in W-K-M's engineering test data files.

**One of the Most Versatile Valves Ever Produced.** W-K-M's *Pressure Sealing Gate Valve* is extremely versatile — can handle almost any low pressure job. It's designed for pressures up to 720 psi (cwp) and temperatures up to 250° F.



ASA 150 lb. (275 cwp) and ASA 300 lb. (720 cwp)

*Available Now*

*Write for Catalog 1200*

5907



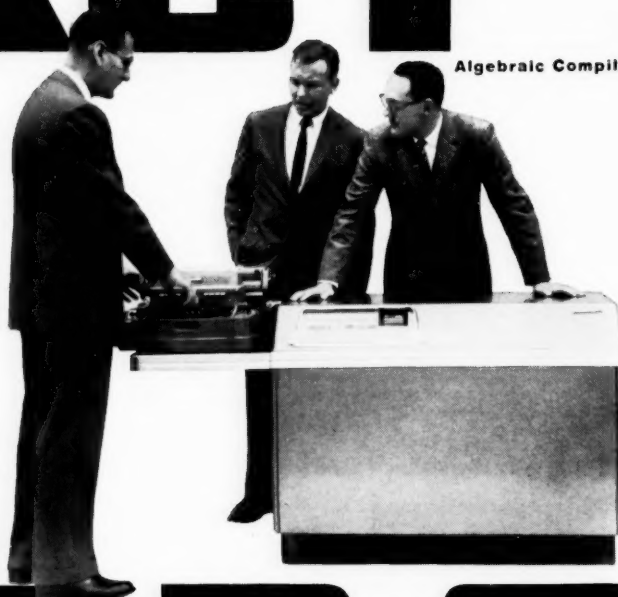
W-K-M DIVISION OF ACF INDUSTRIES, INCORPORATED, P. O. BOX 2117, HOUSTON, TEXAS



Announcing a major breakthrough in computer programming.  
If you've learned algebra, you can learn LGP-30 programming  
in just one day with

# ACT 1

Algebraic Compiler and Translator



# LGP-30

Electronic Digital Computer

The simplest, most economical compiling routine yet developed, ACT 1 now joins with the powerful Royal Precision LGP-30 to give you an unbeatable combination — low-cost, versatile general purpose electronic computation *and* programming.

With only a basic knowledge of mathematics, you can teach yourself ACT 1 in a single day. You can then submit any problem to the computer in simple algebraic form.

ACT 1 translates from a language you know into the machine language of the LGP-30. ACT 1 need not remain in the LGP-30 at compute time—giving you the entire computer memory (4096 words) for

useful calculation. Both compiling and computing times are very rapid. Because the machine language program is punched on tape, it can be automatically brought into the computer whenever required.

Capable of compiling a fixed and/or floating point program for the LGP-30, ACT 1 vastly reduces programming time, gives you final solutions *faster than ever!* It is by all odds the simplest compiler to learn *and* to use.

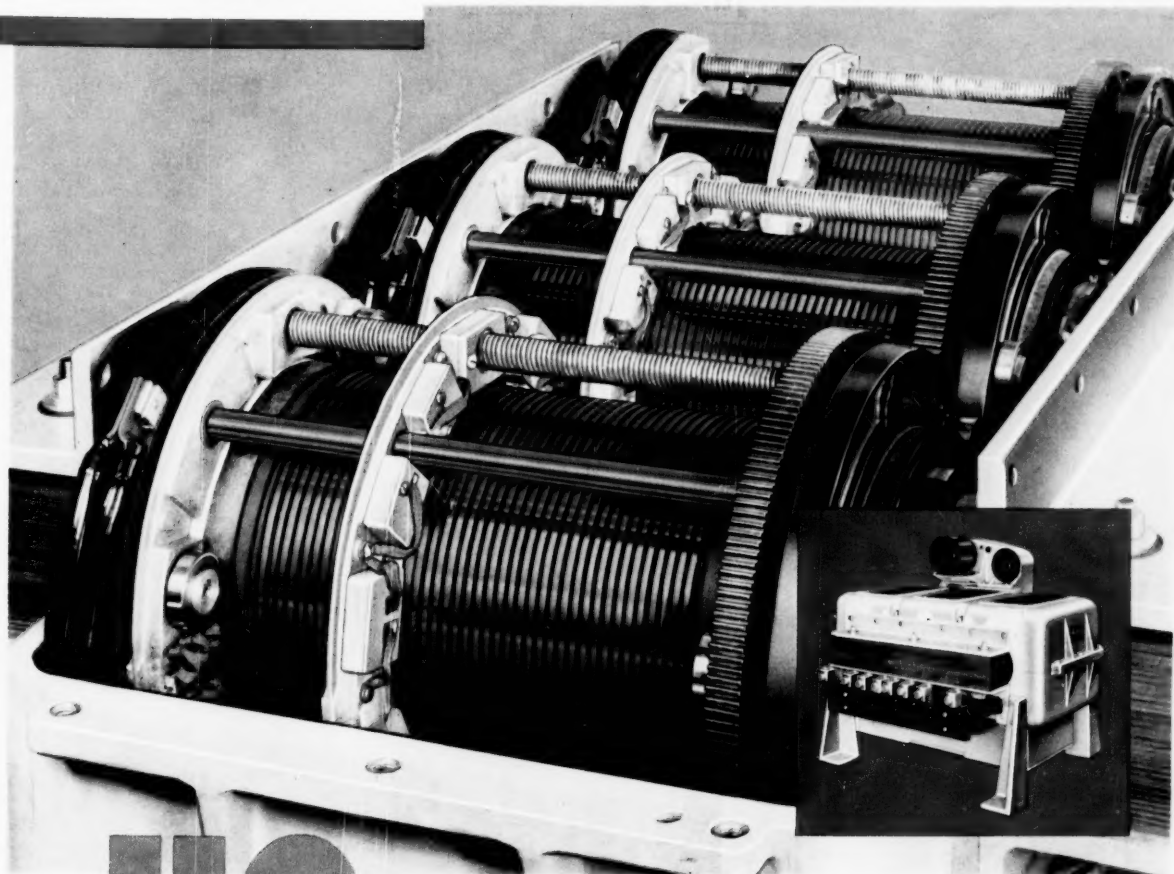
We will be happy to send you the ACT 1 compiling routine free of charge. Write today to Royal McBee Corporation, Data Processing Division, Port Chester, New York.



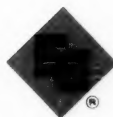
**Royal Precision Corporation**

Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. LGP-30 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For complete information on the LGP-30 write **ROYAL MCBEE CORPORATION**, data processing division, Port Chester, New York

**A COMPLETELY  
NEW CONCEPT** *in variable transformer design!\**



**HC** the **series** **POWERSTAT®**  
*variable transformers*



**THE  
SUPERIOR ELECTRIC  
COMPANY**

**Bristol, Connecticut, U.S.A.**

**HIGH CURRENT CAPACITY**

— The use of a helical wound coil design instead of the conventional toroidal wound coils permits current capacities much higher than previously available in variable transformers.

**EXTREMELY FINE ADJUSTMENT**

— Patented re-entry rings permit continuously-adjustable control of 1600 increments over the range of zero to maximum output voltage. Resolution is better than 1/10 of 1% of the input voltage.

**HIGHEST EFFICIENCY**

— Low resistance brushes are always in contact with only one turn of the helical wound coil resulting in very low voltage drop.

**PLUS:**

**ZERO WAVEFORM DISTORTION, EXCELLENT REGULATION, SMOOTH CONTROL, CONSERVATIVE RATINGS, LINEAR OUTPUT VOLTAGE, LOW COST PER KVA.**

\* The Superior Electric Company's U.S. Patent No. 2,864,992.

©1959 THE SUPERIOR ELECTRIC COMPANY

# NEVER BEFORE

- such high efficiency • such fine adjustment
- such high current capacity

# H-C

the **series**

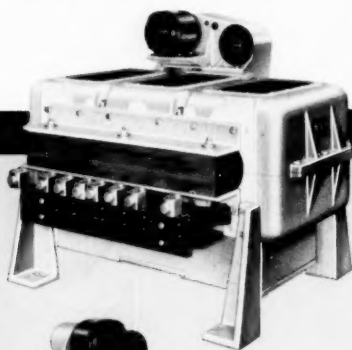
**POWERSTAT®** variable transformers

for heavy duty applications  
requiring cool,  
efficient operation

## TYPES

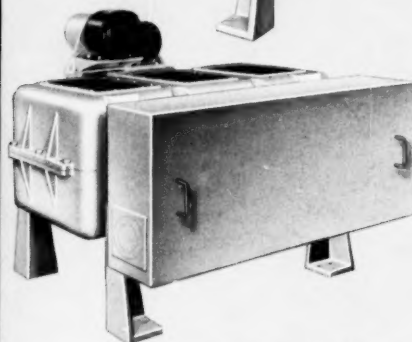
Two 240 volt, 3-phase types are offered. Type 2HC200-3Y is cooled by normal convection. Type 2HCB200-3Y is similar in construction but incorporates fans for forced air cooling of the coils. Output rating of the forced air cooled type is nearly double that of the convection cooled type. Types for 480 volt, 3-phase duty are available also.

**POWERSTATS** of the H-C Series can be remotely operated from a control unit mounted either on the **POWERSTAT** frame or at any other convenient location. Raise-lower signals from the control unit operate the adjustable speed motor driving the contact brush assembly. Full range travel speed is fully adjustable between 15 seconds and 10 minutes. Travel is smooth with fast starting and stopping at any voltage setting. Integrally mounted travel limit switches provide stops and unit protection.



TYPE 2HCB200-3Y (FORCED AIR COOLED)

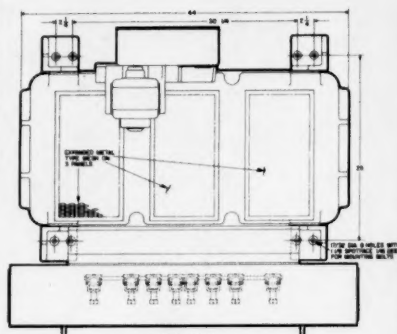
INPUT:	240 VOLTS	60 CYCLES	3 PHASE
OUTPUT:	0-270 VOLTS	360 AMPERES	168 KVA



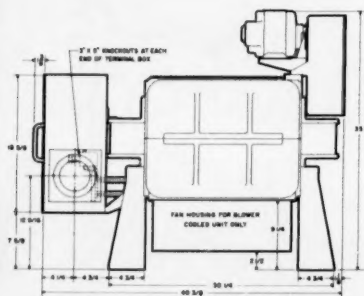
TYPE 2HC200-3Y (CONVECTION COOLED)

INPUT:	240 VOLTS	60 CYCLES	3 PHASE
OUTPUT:	0-270 VOLTS	200 AMPERES	93.5 KVA

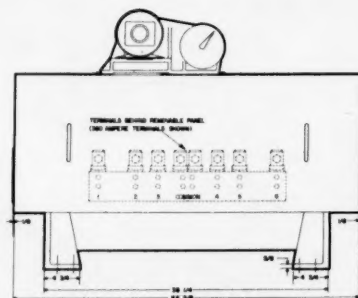
## OUTLINE DIMENSIONS



TOP VIEW



SIDE VIEW



FRONT VIEW

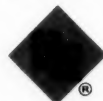
THE SUPERIOR ELECTRIC COMPANY, Bristol, Connecticut

☐ Please send H-C Series POWERSTAT Bulletin. ☐ Please have your representative call.

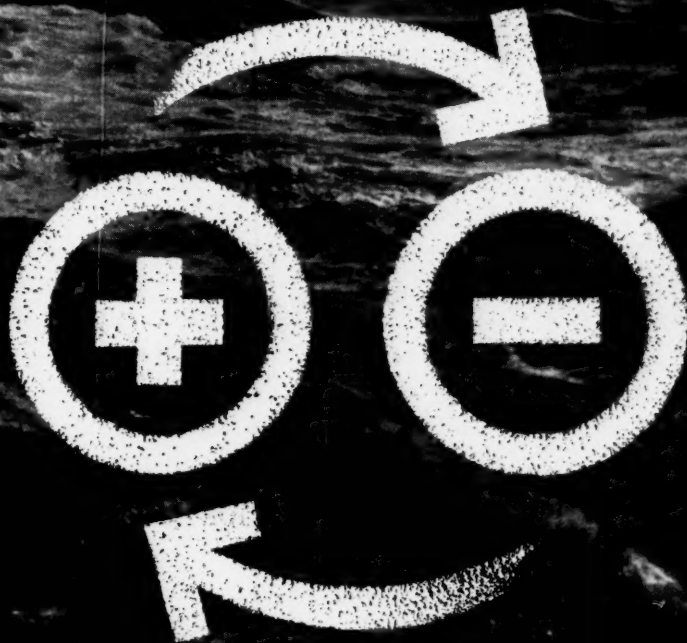
name \_\_\_\_\_  
company \_\_\_\_\_  
address \_\_\_\_\_  
city \_\_\_\_\_ zone \_\_\_\_\_ state \_\_\_\_\_

... FOR YOUR FILES

Request H-C Series Bulletin giving full technical information, ratings and specifications.



THE SUPERIOR ELECTRIC COMPANY  
Bristol, Connecticut, U.S.A.



## ASSIGNMENT:

# SALT WATER CORROSION

**How Lukens Application Research can help you  
find the right steel plate for the job**

Among other materials, our Application Engineering staff has studied the outstanding nickel alloy, Monel, in a variety of salt water applications. Monel is surprisingly economical when used in clad plate form—a Lukens specialty produced by bonding a layer of Monel to a tough, low-cost carbon steel backing plate.

The massive legs of off-shore radar platforms, for example, are protected by Lukens Monel-clad steel plate. Our engineers recommended this shielding for the critical splash areas extending above and below the water line. It has proved a most successful application.

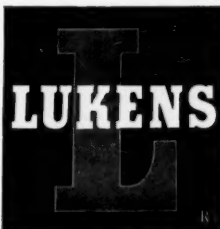
Salt water swimming pools on ocean liners, traditionally of tile, often require ex-

tensive repair between voyages. We helped solve this problem for a well-known steamship line—again with Monel-clad steel plate. Beautiful to look at, these sea-going pools need only routine cleaning and maintenance. Many are now in service—others are being built, including one for the nuclear powered Savannah.

*If your assignment is salt water corrosion, let it be our assignment, too.* Lukens Application Engineers have documented cases covering a wide range of materials selection problems—to help you choose the right steel plate.

Contact Manager, Application Engineering, H119 Services Building, Lukens Steel Company, Coatesville, Pa.

**Helping Industry  
Choose Steels  
That Fit The Job**

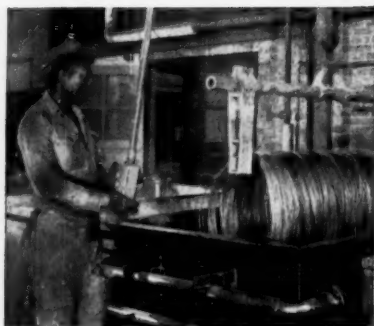


**ASK FOR THE BULLETIN ON LUKENS CLAD STEELS**



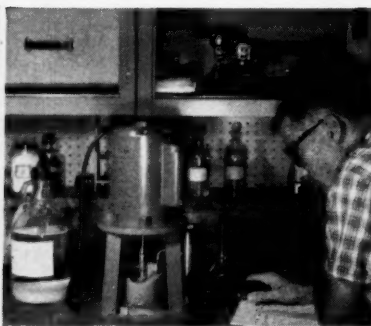
# PUMPAGE

Goulds news about pumps for process industries



## In and out of a pickle

One of the many steps in the manufacture of steel wire is the dunking of coils in a pickling solution. To clean the heavy wire, you need plenty of water plus a high-pressure spray—both adequately supplied at this plant by a Goulds Fig. 3330 pump. This four-inch, four-stage centrifugal, driven by a 50-hp motor, delivers approximately 200 gpm at a discharge pressure of 240 pounds, creating the pressure and capacity necessary to do the job effectively. Another Goulds pump supplies pressure for the spraying of coils of fine wire. Both pumps are operated at five-minute intervals throughout the day and have required just routine maintenance of the packing box since installation approximately five years ago.



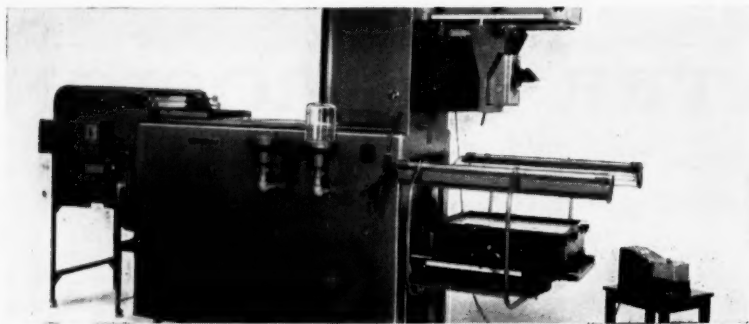
## New test lab for you

How do you select the materials of construction for your chemical pump? Published materials-recommendation charts are generally based on static corrosion tests. These data, however, may be completely erroneous when applied to a centrifugal pump. The combinations of erosion from solids plus differential velocities and impingement with corrosion make selection difficult. Unless actual field experience is available, any recommendation involves guesswork. To minimize guesswork Goulds now offers the best substitute for field experience. A new Customers Products Test Lab is designed to provide answers on how a liquid will react inside your pump. Abrasion testers simulate actual conditions inside a pump. Results from these tests provide information to help solve corrosion problems.



## Emergency at Niagara Falls

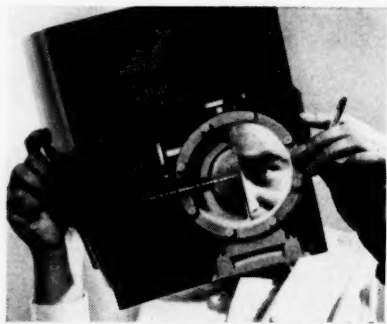
Diversion conduits now under construction at Niagara Falls will take water from the Niagara River and convey it through and under the city to a new hydroelectric plant at Lewiston. During construction of the conduit's 300-foot descent through solid rock to Lewiston, ground water pockets were encountered that had to be drained before construction could continue. An emergency call came to Goulds: Could we help? Quick delivery of Goulds 3135 centrifugals saved the contractor many thousands of dollars in lost time; six more pumps were added as the need for greater capacity developed. Selected for ease of maintenance and ability to handle rugged solids, these process pumps solved this unusual application problem. Get the details by writing.



## Small pump solves big problem for Photostat Corp.

Builders of original equipment are finding that a Goulds process pump fits their requirements ideally. Dependability is imperative, for if the pump fails, the entire unit is out of service. Take, for instance, the case of Photostat Corporation. Inside a Photostat Copying Machine, the complete photographic process occurs automatically: the making of a negative plus developing, washing and drying operations. Because the

developer solution must be circulated constantly, Photostat needed a compact pump that could reliably provide continuous service. We supplied the pump—Goulds Fig. 3604, a  $\frac{3}{4}$ " centrifugal with "big pump" stamina. Today hundreds of these pumps are in operation on new equipment and as replacements for older equipment. Have equipment that requires constant circulation of liquids? Write for Bulletin 725.6.

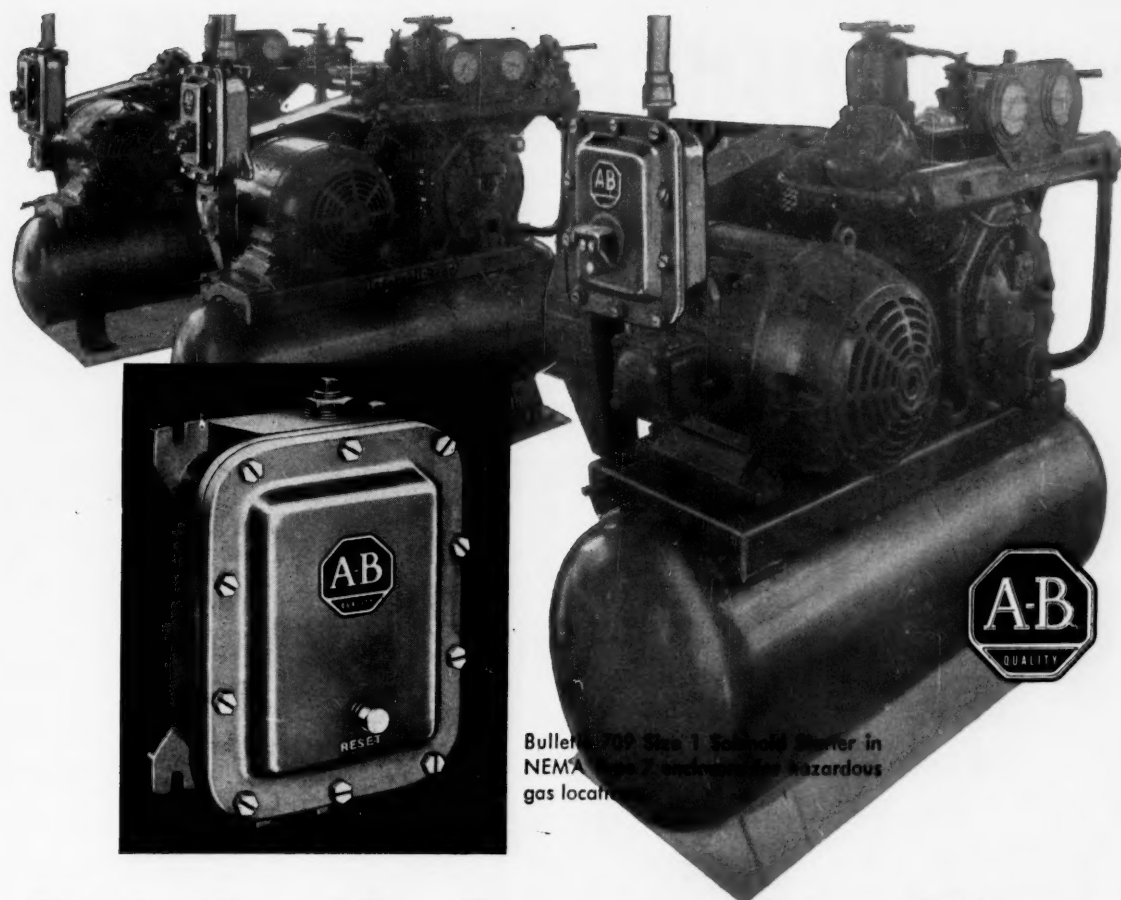


## Inside the Goulds-Pfaudler pump

Inside this unusual booklet are facts you should know about a revolutionary answer to your corrosive-pumping problems. It's all about the Goulds-Pfaudler glassed pump, as the only pump of its kind. This booklet gives the answers to question after question, starting with "What is glassed metal?" and ending with "Is the glassed pump operated like any centrifugal pump?" Send for your free copy today. Goulds Pumps, Inc., Dept. CE-119, Seneca Falls, N. Y.

**GOULDS**  **PUMPS**





Bullet 1700 Size 1 Solenoid Starter in NEMA Type 7 enclosure for hazardous gas locations

## Cut Costly Inspection Time

Allen-Bradley starters provide millions of operations without maintenance

Valuable maintenance time can be saved by eliminating "routine" inspections. Install Allen-Bradley starters, and you can forget them for long periods of time—they will prove completely reliable without regular "service" inspection.

It's the simple solenoid contact mechanism in Allen-Bradley starters that makes this possible. There is only ONE moving part—and this is your assurance of millions of trouble-free operations. There are no bearings to corrode and stick . . . no

flexible jumpers to wear and break. In addition, their double break, silver alloy contacts are always in perfect operating condition—and remain so until completely worn away. Also, all A-B starters have permanently accurate and reliable thermal overload relays that protect motors against burnouts—whatever the atmospheric conditions may be.

Specify Allen-Bradley *quality* motor control . . . you'll save much valuable maintenance time—and maintenance dollars.

Allen-Bradley Co., 1337 S. First St., Milwaukee 4, Wis.  
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



NEMA 4  
Watertight  
Weatherproof



NEMA 9  
For Hazardous  
Dust Locations



NEMA 8  
For Corrosive  
Hazardous Gas



NEMA 11  
Corrosion-  
proof

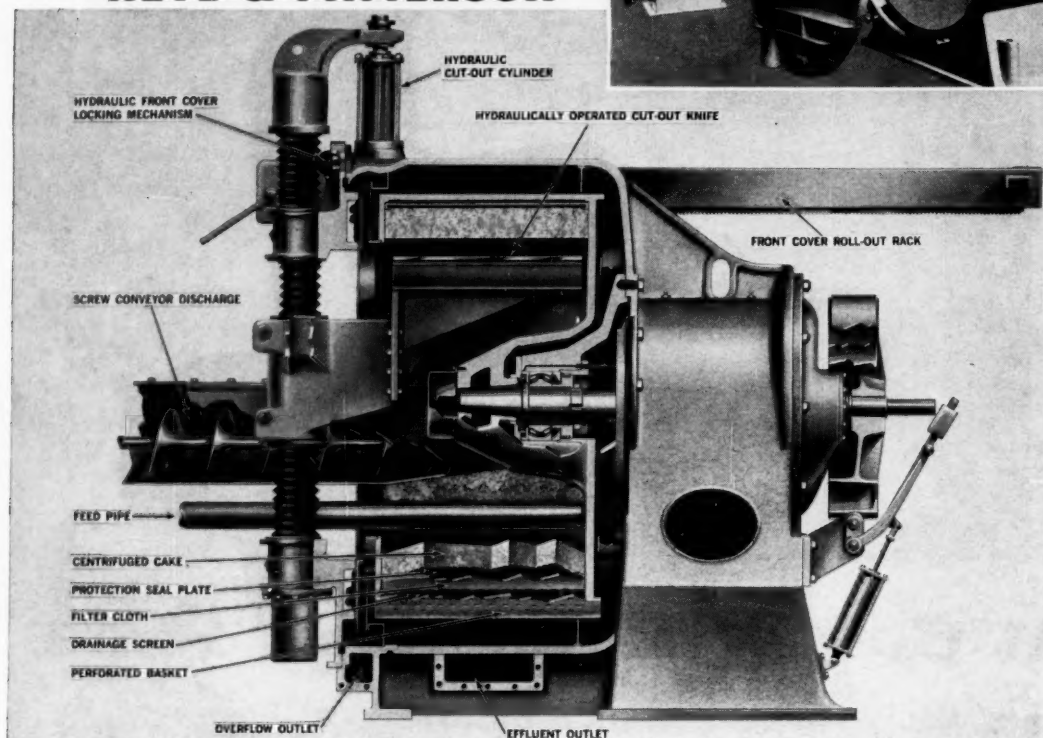
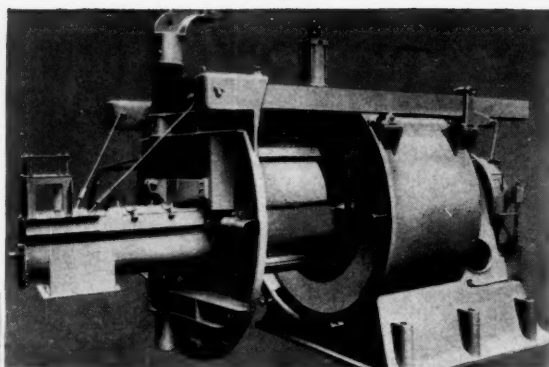
Quality  
Motor Control

# the CENTRIFUGE

*for Top Performance...*

Sold and Serviced by

**HEYL & PATTERSON**



*Fill Faster... Spin Faster... Produce More at Lower Moisture...*

Compare the facts when specifying equipment for your important centrifuging operations. Take a good look at the table below:

DESIGN DATA OF REINEVELD CENTRIFUGALS

Bowl Diameter	28" S	36"	51"	68"	80"
Bowl Content (cu. ft.)	1.2	4.9	13.2	28.1	43.3
Bowl Content (gallons)	9.0	36.5	99.0	211.0	325.0
Screen Area (sq. ft.)	6.2	13.5	27.4	46.5	65.0
Design RPM	2000	1500	1085	850	750
Equivalent Force (G's)	1560	1140	850	700	625

You will find that Reinevels produce the greatest force field for any given bowl diameter.

These higher G's mean lower product moisture at higher capacities, of course.

Only Reineveld builds the larger Centrifuges—even up to 80" bowl diameter. More important, a comparison of the bowl content for any given diameter Centrifuge will quickly convince you that Reineveld has the largest capacity—by far.

Feature for feature—the facts point to Reineveld as the outstanding Centrifugal.

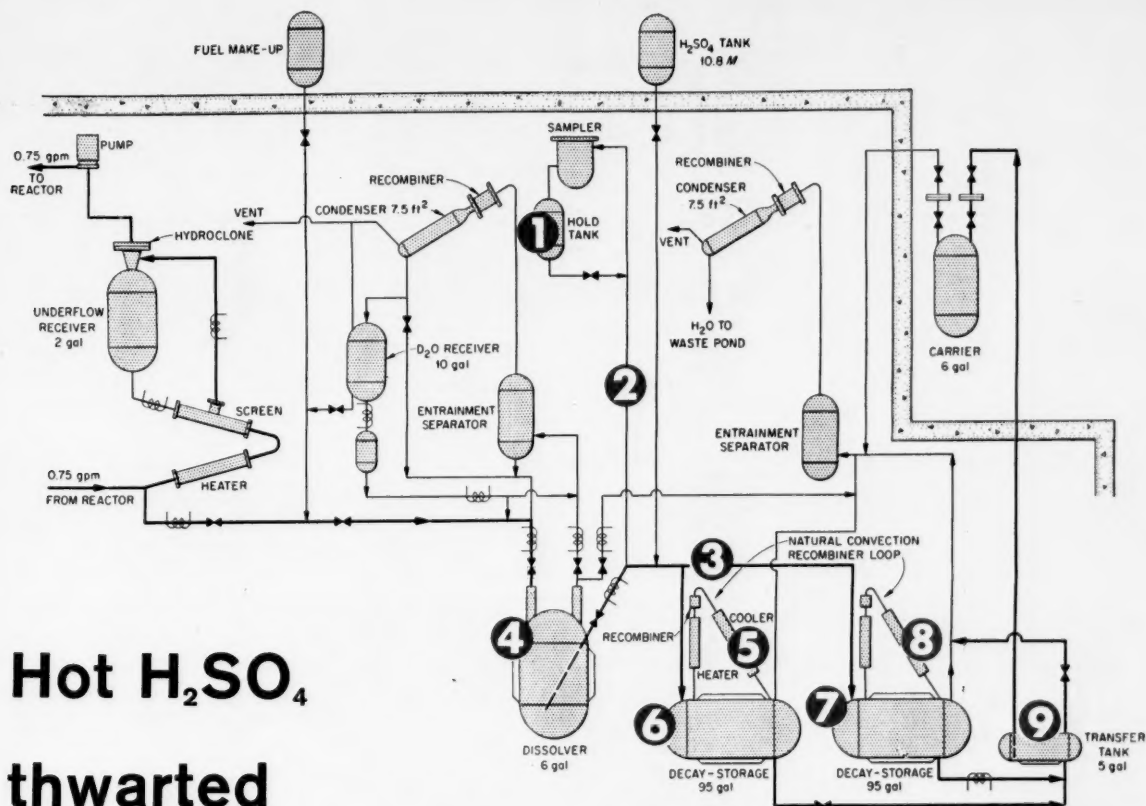
Heyl & Patterson is ready to serve your next centrifuging program.

Consult our listing in CEC,  
or write for Bulletin 356

**HEYL & PATTERSON, inc.**

55 FORT PITT BLVD., PITTSBURGH 22, PA.





# Hot H<sub>2</sub>SO<sub>4</sub>

## thwarted

## on 9 fronts by *Carpenter No. 20Cb\**

● With the process diagrammed above, insoluble corrosion and fission products are removed from enriched uranyl fuel by the use of hot sulphuric acid. Purification of the fuel is accomplished by centrifugal separation in a hydraulic cyclone operated at reactor temperature and pressure.

Continuity of this process has to be amply fortified against the ravages of the hot acid. And it is—with Carpenter Stainless No. 20Cb. All tanks, coolers, process lines and other equipment in contact with the H<sub>2</sub>SO<sub>4</sub> solution at 100° F. to boiling are made of this

super corrosion-resistant alloy. Long-life, low-cost corrosion control is thus assured in this process.

Is sulphuric acid or other strong corrodents eating up costly equipment and production time in your plant? Then it's time to put Carpenter Stainless No. 20Cb on the job and put a cost-saving end to your trouble for a long time. This best single answer to most severe corrosion problems is available in eight different forms.\* Contact our nearest office or distributor for technical data, prices and delivery. Ask for Bulletin 108A. The Carpenter Steel Company, Alloy Tube Division, Union, N. J.



### Available from stock

Your orders for sheet, plate, pipe, tubing, strip, bars, wire and billets of Carpenter No. 20Cb can be filled promptly from warehouse stocks.

... at new lower prices

your master key  
to cost-saving  
corrosion control



### Stainless No. 20Cb

Visit Our Booth 675 at the Chemical Exposition, Nov. 30-Dec. 4, New York City Coliseum



## Modern "One-Hoss Shay"

Remember "The Wonderful One-Hoss Shay"? It ran for 100 years, each part wearing so evenly with the others that all disintegrated at the same instant!

Uniformity of wearing qualities is a key characteristic of Morris Pumps. Witness the worn-out impeller from a Morris Type K pump at right. The vanes are uniformly worn to less than  $\frac{1}{2}$ " thickness. The suction shroud is completely gone, except for a paper-thin portion little larger than a hand.

Yet the retention of original vane contour maintained hydraulic performance at normal levels, so that only a routine overhaul revealed the extent of overall wear.

Durability and dependability over the long pull are the *normal achievements* of Morris Pumps. They are the result of proper design backed by superior materials, careful engineering, and fine workmanship.



• Why not call on our engineers for qualified recommendations of pumps you can depend on for years of uninterrupted service.



MORRIS MACHINE WORKS BALDWINVILLE, N.Y.





## Novel Aluminum-Insulated Tanks for Double-Duty Storage of Liquid Butane and Anhydrous Ammonia

The science of cryogenics is no more profitably applied than at St. Paul Ammonia Products, Inc., Pine Bend, Minn., where two 45,000 bbl. low-pressure, refrigerated steel tanks with multiwall aluminum insulation were recently placed in dual-service.

During the summer and fall, liquefied butane is stored at  $+25^{\circ}\text{F}$ . During the winter and spring, anhydrous ammonia is stored at  $-18^{\circ}\text{F}$ . The design pressure, in both instances, is 5 psig.

Thus, in summer when butane is more readily available, the two tanks preserve huge quantities of potential B.t.u.'s in a relatively small area, thanks to storage as a liquid at a low temperature and pressure. The butane is used by St. Paul Ammonia as a raw material for manufacturing anhydrous ammonia, which, in turn, is stored in the tanks for the spring, when demand from fertilizer users is heaviest.

A low operating cost is achieved by a completely automatic system of filling and emptying the tanks. Outer layers of aluminum to reflect the sun's rays provide an insulation that effectively aids in maintaining the desired temperatures. Asbestos Products, Inc., St. Paul, installed this novel insulation.

Designed, fabricated and field-erected by Graver, these two tanks represent one of many types of cryogenic storage and processing equipment Graver has been called on to design and produce. The opportunities for cutting costs and improving efficiency are substantial when the science of cryogenics can be employed. If there is an application in your operation, it will pay you to talk it over with Graver.



PIONEERS IN FABRICATING FOR  
**GRAVER TANK & MFG. CO.**  
 DIVISION—UNION TANK CAR COMPANY  
 EAST CHICAGO, IND.

**GRAVER**®

APPLIED CRYGENICS

*Plants and Offices  
 Across America*



# TYGON<sup>®</sup>

*Low Cost, Long-lasting  
Protection Against  
Corrosive Attack*

See us at Booth 111, 27th Exposition  
of Chemical Industries, New York  
Coliseum, Nov. 30 thru Dec. 4.



There's only one sensible way to measure cost when you buy paint to protect processing equipment, and that's *cost per year per square foot of protection*. A few pennies saved in cost per gallon can mean dollars lost if the paint fails on the tank.

That's why you'll find many chemical plants with low cost maintenance records use Tygon Coatings almost exclusively to provide maximum protection at minimum cost.

412-F



## U. S. STONEWARE

AKRON 9, OHIO

NEW YORK • CHICAGO • HOUSTON • LOS ANGELES

DEVELOPMENTS...

NOVEMBER 16, 1959

# Chementator

T. PETER FORBATH

**Universal Oil Products has come up with a new process for removing sulfur compounds from oil, gasoline. Called Merox, it's claimed to be cheaper than rival sweetening routes, said to be in successful operation at several plants.**

**Tire-cord battle between nylon and rayon has spilled into Mexico. Celulosa y Derivados is building \$3-million nylon plant aimed at country's predominant rayon-cord tire market. Celanese's Mexican arm, big rayon-for-tire maker, is eyeing possibility of entering nylon cord too.**

**Conoco's petroleum-base fatty alcohol plant to use Ziegler process will have 50-million-lb./yr. capacity, is slated on stream by '61 at Lake Charles, La.**

**Oronite's 20-million-lb./yr. maleic anhydride plant at Richmond, Calif., reportedly will be first to use Badger Mfg. Co. process.**

## Anodic defense routs corrosion attack

In switching their defense from usual cathodic protection to anodic, engineers seem likely to mount a winning battlement in their dollar-bleeding war against corrosion. Continental Oil has made the switch with its newly developed Anotrol process, claims now it can completely rout the attack on steel and stainless of enemies such as sulfuric, nitric and phosphoric acid, sodium and lithium hydroxide, ammonium nitrate and aluminum sulfate.

Key to Conoco's defense: anodic passivation. In this scheme, an impressed current builds up a protective metal oxide film on the surface of the material under corrosive attack. Equipment to be protected is made the anode, corrosive solution the electrolyte, and a platinum electrode is inserted as the cathode along with a saturated calomel or silver chloride reference electrode.

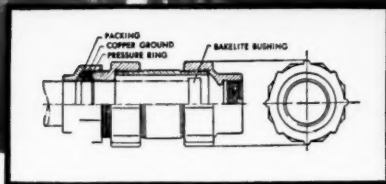
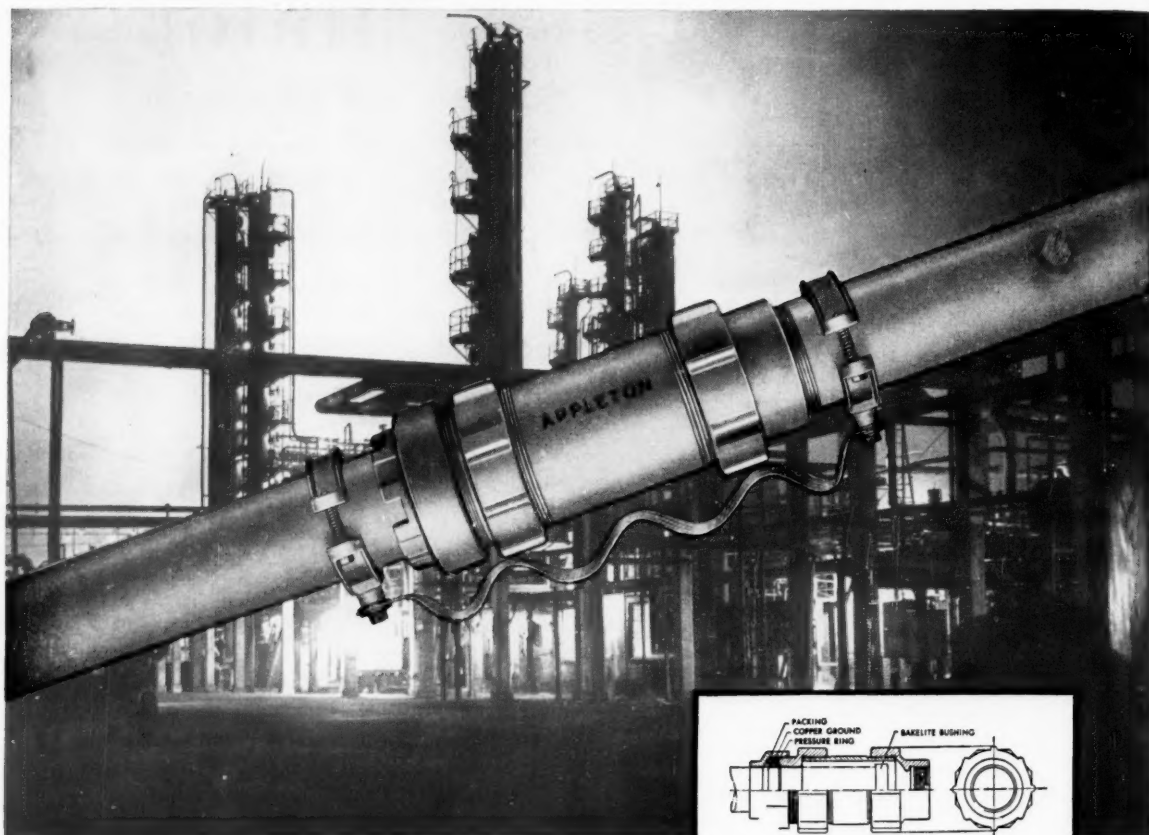
An electronic controller supplies up to several hundred amps of current. As current is increased, voltage potential drops and corrosion rate climbs. But at a certain point voltage reverses itself while current remains low. This is the passive range where the oxide film is formed.

Conoco has been using this technique for the past year at its Baltimore sulfonate plant, specifically on a mild steel oleum storage tank and blowcase, and a 306 stainless neutralizer wherein sulfonic acids are reacted with caustic soda. Result: Whereas previously equipment cried for repairs several times a month, not a single repair has been needed since installation of the Anotrol system, company maintains.

Conoco, seeking patents for Anotrol, plans to license the process and equipment, and serve as consultants. Cost of unit depends on complexity of job, can vary from \$50 to \$5,000.

But Anotrol is no corrosion panacea. For it to work, corrosive solution must be a good conductor, and metal-liquid system must be capable of anodic passivation. Too, it can't

# APPLETON® "XJ" Conduit Expansion Joints



## Relieve the *strain* of expansion and contraction on long runs of rigid conduit

Temperature changes place a terrific strain on all long conduit runs. To relieve this potentially dangerous condition, it is best to install APPLETON "XJ" Expansion Joints at frequent intervals along the entire system. These weatherproof joints, for use with heavy-wall conduit, have a metallic packing and a bonding jumper to assure the entire conduit system remains a continuous electrical conductor. The jumper, installed in accordance with U. L. recommendations, gives double protection against extreme expansion movement reducing the effectiveness of the metallic bond.

As the conduit is inserted in the joint, a bushing is placed on the end in the manner shown. This bushing

permits maximum conduit movement and yet the conduit can never pull free of the joint. The APPLETON "XJ" Conduit Expansion Joint features a metallic packing and pressure ring at the flexible end to keep the joint weatherproof at all times.

Wherever a long run conduit installation exists, the need for APPLETON "XJ" Expansion Joints exists. Interior or exterior, from Texas to Maine, temperature strains do exist, so take advantage of APPLETON'S product research program to give you the precision products you require . . . APPLETON "XJ" Weatherproof Expansion Joints for all long run conduit installations.

*Sold Through Franchised Distributors Only*



**APPLETON ELECTRIC COMPANY**

1701 Wellington Ave., Chicago 13

*Also Manufacturers of:*



"ST" Series Connectors



Malleable Iron Unilets



Industrial Lighting Equipment



Outlet Boxes

handle halogens, reducing environments or copper-base metals.

## Second engineering-contract fight boils

Hydrocarbon Research, Inc. has been socked with a lawsuit that's almost a letter-for-letter replica of the one Kellogg is currently fighting against Monsanto and Heyden Newport (*Chementator*, May 4, p. 55). A \$10,708,750 claim filed by Taiwan Fertilizer Co. in Federal Court in Trenton, N. J., late last month hurls much the same charges of fraud, breach of contract and technical incompetence at HRI as were hurled at Kellogg earlier this year—and for much the same reason.

Action springs from troubles the Nationalist Chinese firm has been having in putting into commercial production a 275-ton/day, Vulcan-Inventa-process urea facility in Nankong, Taiwan. According to the fertilizer company, HRI in Oct. 1954 contracted to deliver this facility by Sept. 1957. When it became apparent that HRI wouldn't meet the date, both parties agreed to an extension to Sept. 1958. Say the Chinese, the plant has yet to be put into successful commercial operation.

Thus Taiwan is seeking damages to compensate for loss of profits and out-of-pocket expenses resulting from the delay. Company complains: (1) HRI misrepresented its technical knowledge of the Inventa process when first entering into the contract, (2) has been negligent in carrying out its contract obligations ever since and (3) has failed entirely in fulfilling its contract obligations since plant is still not operating.

HRI's Executive VP Edwin Layng states flatly that there's no justification for this lawsuit. He maintains that HRI was hired to engineer, and supervise the building and startup of a 150-ton/day ammonia plant to provide raw material for the urea plant. This has been done, declares Layng. Construction officially was completed in Mar. 1958, plant has been able to supply ammonia needs of urea plant since. Conversion of ammonia to urea, he stresses, was the responsibility of Vulcan Copper and Supply under license from the Swiss firm Inventa A.G.

Vulcan declares it isn't a party to this lawsuit and that, accordingly, it doesn't consider it proper to comment on the matter. Notes company president, T. O. Wentworth, Vulcan's relations with Taiwan have been and continue to be "cooperative and amicable."

## Du Pont switches to new acrylo process

Out to become its own best raw material supplier in acrylic fiber (Orlon) production, Du Pont has now started construction on its second acrylonitrile plant. But for the flow-sheet of this facility, slated on stream by spring of '61 at Beaumont, Tex., the company has departed from classical acrylo processing procedures. Whereas its first plant (now under construction at Memphis, Tenn.) uses the well-known hydrogen cyanide-acetylene route, Du Pont's Beaumont unit will make acrylonitrile from propylene and nitric oxide via a newly patented process.

Despite reports on the development published elsewhere, a company spokesman stresses, Du Pont's new process does not involve the reaction of ammonia and propylene. Ammonia enters the picture merely in an ancillary way—as the most economical, though not only possible, source of the nitric oxide. Instead reaction is a one-step vapor-phase nitrosation of propylene by nitric oxide in the presence of a dehydrogenation catalyst (e.g., silver on silica) at 850-950 F.

It's on this point that Du Pont's process differs from Sohio Chemical's ammonia-propylene acrylonitrile flowsheet now being commercialized at Lima, Ohio (*Chementator*, Feb. 23, p. 55). That process involves the one-step conversion of ammonia and propylene to acrylonitrile by catalytic air oxidation at 550-1,000 F.

New process offers advantages over the HCN-acetylene route such as lower-cost starting materials, and simplified operation thanks to reduced number of processing stages. But older route enjoys a history of successful full-scale operation. Notes Du Pont, that's what the new process will have to match before the company will make a decision of the comparative worth of the two processes.

## Dutch equipment makers after dollars

U. S. process equipment makers, already aching from the stiff competition being dealt them by foreign firms, will be taking on still another crowd of European rivals in the months ahead.

CE learns that the some 100 process equipment manufacturers of Holland are teaming up for a full-scale assault on the U. S. chemical

(Continued on page 92)

# HOW SHELL SOLVED A REFINERY



Aerial view of treatment plant shows Dorcco Clarifloculators in left foreground, and Clarifiers at upper left. Distributor is at upper right.



# WASTE DISPOSAL PROBLEM



*Unique treatment plant  
meets strict requirements  
in Puget Sound area ...  
using Dorr-Oliver equipment*

In establishing its refinery near Anacortes, Wash., the Shell Oil Company faced strict requirements for control of pollution in an important commercial fishing and recreational area. Requirements are met by efficient waste treatment facilities that may well serve as a model for the industry.

These facilities handle all process and drainage waters from the refinery, as well as sanitary wastes. Operations include oil-water separation, chemical flocculation, biological treatment involving trickling filtration, activated sludge and complete sludge handling. Among the many special problems solved is the virtual elimination of objectionable phenols. This is largely accomplished in the biological treatment section, by utilizing a strain of bacteria specially adapted to phenol consumption. The excellent results achieved are shown in an analysis of the plant effluent, which averages only 7 ppm of oil and 0.15 ppm phenols, both well below the required State minimums.

Dorr-Oliver equipment installed includes two 60' dia. Clariflocculators, a distributor for the 140' dia. trickling filter and two activated sludge clarifiers designed to handle 2000 gpm of effluent. Sludge handling equipment includes a 36' dia. Dorr Thickener and two 8' dia. x 12' long Oliver Rotary Vacuum Precoat Filters.

The wide experience of Dorr-Oliver is at your service in designing equipment for every industrial waste treatment problem. For information, write Dorr-Oliver Incorporated, Stamford, Connecticut.

*Consulting Engineers: Bechtel Corporation, San Francisco, Calif.*

*Dorrco and Clariflocculator—U. S. Pat. Off.*



## **DORR-OLIVER**

**WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT**

process industry marketplace. Their effort will be coordinated by Holland's Ministry of Economic Affairs at The Hague and the Netherlands Trade Commission in New York. Notes a trade commission spokesman, the firms involved have done virtually no business in America until now.

Historically among the world's best traders, the Dutch are likely to prove tough competitors for the Americans. Chief reason, quite apart from the first-rate quality of their goods, is the fact that Holland, along with Italy, has the lowest wage scale in Western Europe. This means, observes a U. S. vendor, that the Dutch probably will be able to market the high-labor-cost, tailor-made equipment traditional in the chemical industry at exceptionally competitive prices.

It is, in fact, with tailor-made rather than on-the-shelf items that the Dutch hope to crack the U. S. market. They include heat exchangers, evaporators, distillation columns, crystallizers, centrifugals, dryers, mixers and crushing mills.

Spur behind the Dutch drive is the intolerable imbalance of dollar flow between Holland and the U.S. Currently, the Dutch are spending \$3 in the U.S. for every \$1 Americans are spending in the Netherlands.

### Another flowsheet hits busy urea market

Add another urea flowsheet to the already hotly competitive urea-process marketplace. Japanese firm Toyo Koatsu reveals it's ready to license the new total-recycle urea route that it has on stream at Chiba, Japan in a 66,000-metric-ton/yr. plant. And, reports company's U. S. agent Mitsui & Co., several American firms have expressed lively interest in it.

Toyo is tackling some mighty stiff competition with the move. Montecatini already has a solid foothold in the U. S. market with three plants on stream using its process and a fourth under construction. Chemico's new process is also winning commercial acceptance. And Foster Wheeler, which offers Pechiney's process, has teamed with Grace Chemical to offer potential customers engineering improvements the latter has developed.

Strengthening Toyo's hand in the shaping battle is the fact that raw material and utility consumption figures for the Japanese process compare favorably with those of competing processes. One ton of urea requires: 0.75 tons  $\text{CO}_2$ ; 0.59 tons  $\text{NH}_3$ ; 3,200 lb. steam; 155 kwh.

electrical power and 27,000 gal. cooling water. Too, savings are claimed in capital investment though no figures have been cited.

### Computer wins fractionator-control job

Sun Oil's automation study at its Marcus Hook, Pa., refinery (*Chementator*, Mar 23, p. 92) is taking on a commercial character. Company tells *CE* that it has successfully applied computer control to a 30-plate, 6-ft.-dia. desobutanizer.

Computer involved is Westinghouse's "peak-seeking" Opcon which got its first process control try at Dow Chemical (*Chem. Eng.*, Feb. 9, p. 64). It's used to measure three column variables, apply economic criteria for maximum profit rate and adjust two controller setpoints accordingly.

Signals of the three variables—steam flow to reboiler, overhead composition and overhead flow rate—are combined in pre-programmed strategy to fix "best" values consistent with dollar worth of overhead and bottoms products, steam to reboiler and cooling water on overhead condenser. Setpoints from the computer control overhead product valve and steam-to-reboiler valve.

Though it's too early to evaluate profitability of the Opcon, Sun engineers indicate that they're pleased with computer's performance to date. Main interest now is how computer control on several individual units, as with Opcon, compares with computer control of entire process, as in the Texaco application (*Chem. Eng.*, Oct. 19, p. 102).

Criticism of the assumptions made in Sun's application of Opcon has been raised by industry observers. Feed quantity, composition and thermal conditions vary from time to time, as do steam quality, pressure and other environmental conditions, they note. These factors could affect column operation to such an extent that optimizing control could be overshadowed. Sun engineers say they are watching these variables closely, however.

### New application found for ACL kiln

Allis-Chalmers-Lepol traveling-grate kiln has been seeking new worlds to conquer ever since it established itself in the cement industry (*Chem. Eng.*, April 21, 1958, p. 60). Now it has found one—the manufacture of chemical-grade lime.

Dow has elected the ACL calcining sys-

When it comes to

# FLUORINATING AGENTS

FLUORINE, LIQUID AND GAS

HYDROGEN FLUORIDE

CHLORINE TRIFLUORIDE

BROMINE PENTAFLUORIDE

BROMINE TRIFLUORIDE

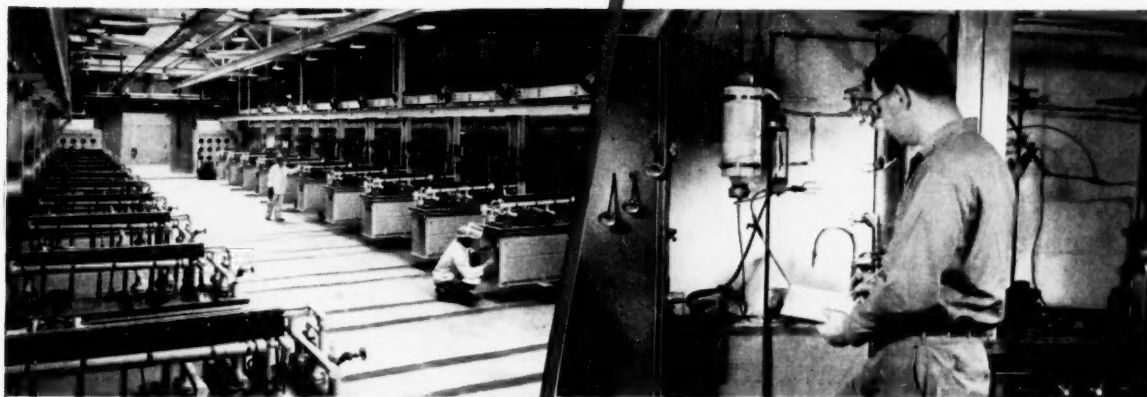
IODINE PENTAFLUORIDE

IODINE HEPTAFLUORIDE

MERCURY DIFLUORIDE

SILVER DIFLUORIDE

ANTIMONY PENTAFLUORIDE



Come to

# GENERAL CHEMICAL

If you're thinking about fluorinating—or have a problem with your present fluorinating agent—come to General Chemical. As America's primary producer of elemental fluorine and fluorine-based chemicals, we can provide you with an extremely wide range of fluorinating agents in research or commercial quantities. Any or all of the ten fluorinating agents listed above are worthy of thorough investigation. For further information on those that interest you, contact our Product Development Department.

**BAKER & ADAMSON<sup>®</sup>**  
*Fine Chemicals*



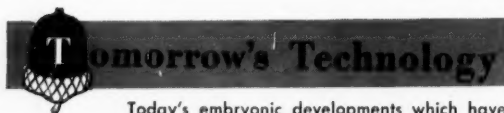
Visit Allied Chemical Booths #955, 957, 959  
and 961 at the 27th Exposition of Chemical  
Industries in New York City, Nov. 30-Dec. 4

**GENERAL CHEMICAL DIVISION**  
40 Rector Street, New York 6, N. Y.

tem for what's heralded to be the world's largest-capacity lime kiln. Reason: Because of its preheating stage, the system allows markedly increased kiln output without increased size.

Dow's unit, to be built by A-C at Ludington, Mich., will measure 160-ft. long by 11½-ft. dia. When it comes on stream late next summer, kiln will calcine 600 tons/day of north Michigan limestone—roughly twice as much as the two similar-size kilns company now runs at Ludington.

Installation is third application of the ACL system; the first two are at cement plants. And as far as A-C is concerned, it marks the beginning of widespread and varied use of the versatile system. At its Carrollville, Wis., pilot plant, company is studying the system for phosphate rock nodulizing, various ore treating and wet-process-cement making.



Today's embryonic developments which have special significance for chemical engineers

### ● Phenol via radio-oxidation?

The Russians are edging a phenol flowsheet towards commercialization that incorporates (1) a processing scheme never before tried on a large scale and (2) a processing scheme often before tried but without any lasting success. *CE* learns that the Soviets are now studying plans for a 10,000-metric-ton/yr. plant that will harness radiation to the job of directly oxidizing benzene into phenol.

Revealed superficially and inconspicuously at the Soviet Exhibition in New York's Coliseum last summer, the flowsheet involves the irradiation with 950 roentgens/hr. of a 50-50 mixture of water and benzene at 190 C. Radiation activates the benzene ring and water provides the needed oxygen. Result is a product stream containing 55% phenol, 41% unnamed resin, 2% carbon dioxide and traces of benzoic and maleic acid.

While idea of producing phenol by direct oxidation of benzene is not new, no one has succeeded in making an economic go of it to date. Allied's Solvay Process Div. made a determined try in the '40's with a 5,000-ton/yr. plant using purely thermal oxidation of benzene with air at 600-800 C. After running

sporadically for 6 yr. it was shut down as uneconomical in 1947.

Attraction of direct oxidation is that it makes for a much simplified, thus cheaper-to-build-and-operate plant. But stacked against this attraction is the fact that the process almost inescapably gets very low yields. Reason: Phenol is much more readily oxidized than benzene, so degrades to "gunk" as soon as it's formed. As a result, process stands its best economic chance only when benzene is very cheap and phenol commands a high enough market price.

Radiation, speculate some observers, may play a part in improving yields in the Russian process. But more likely, they say, benzene in the Soviet economy is regarded as a low enough priced commodity to make the yield situation economically tolerable.

### ● Research and development briefs

**Direct observation of free radical reactions** is possible via electron paramagnetic resonance spectroscopy. Varian Assoc. (Palo Alto, Calif.) reports that it has developed a sensitive EPR machine that can be used to study the free radical procedure of polymerization reactions, thus provide clues for the development of new polymers.

**High-temperature-resistant adhesives** for rocket and aircraft jobs can be made by incorporating inorganic compounds in adhesive-polymer systems, says Narmco Industries (San Diego, Calif.). Combination of 32-48% antimony pentoxide with epoxy resins gives material that holds up to 85% of its strength after extended exposure to 600 F.

**New purification process may make lithium** attractive as high-temperature, high-performance coolant in nuclear reactors. Currently, impurities in commercial material—especially nitrogen and oxygen—make lithium too corrosive for this high-temperature job. Oak Ridge National Lab has developed means of reducing nitrogen and oxygen content below 100 ppm. Filtering gas-packed lithium under argon at 250 C. removes bulk of these contaminants; gettering with active-metal sponge as titanium at 800 C. for 24 hr. lowers nitrogen to desired level, and cold-trapping for 100 hr. does same for oxygen content.

**For more on DEVELOPMENTS.....96**



*If your plant handles corrosive chemicals...*



## Cut maintenance and replacement costs by using pipe lined with a TFE resin

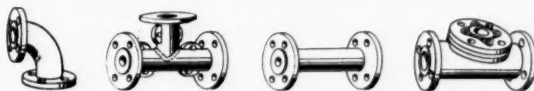
Corrosive processes in use in the chemical industry involve the constant threat of costly shutdowns for pipe replacement and system maintenance . . . the safety hazards of corrosion-caused leaks and disassembly of lines. To minimize these dangers, more and more chemical processors are using pipe lined with a TFE-fluorocarbon resin. Even under a combination of adverse conditions—acidic, solvent, high-temperature or oxidation—pipe lined with TFE resins provides outstanding reliability of performance. In addition, the superior high-temperature serviceability of pipe lined with TFE resins may make possible the use of higher operating temperatures for increased production capacities, conversions and even yields.

TFE-fluorocarbon resins are unaffected by HCl liquid and vapors, fuming nitric acid—white or red—hydrofluoric acid, organic solvents and reagents. Pipe lined with these resins is rated for use up to 500°F. Its non-adhesive surface prevents plugging by high-viscosity materials. It will not shatter under vibration, thermal or physical shock.

The liner flared over the flanges provides protection for the steel from the process fluid and eliminates the need for additional gasketing. And now you can get a complete assortment of standard sizes of flanged pipes and fittings lined with Du Pont TEFLON TFE resins.

You can insure long service life, greatly reduced maintenance and downtime, and greater plant safety by installing pipe lined with TFE resins. Call your local pipe supplier for more information, or write to: E. I. du Pont de Nemours & Co. (Inc.), Advertising Department, Room T1011, Nemours Building, Wilmington 98, Delaware.

**In Canada:** Du Pont of Canada Ltd., P.O. Box 660, Montreal, Quebec.



**TEFLON®**  
TFE-FLUOROCARBON RESINS

TEFLON is Du Pont's registered trademark for its fluorocarbon resins, including the TFE (tetrafluoroethylene) resins discussed herein

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



DEVELOPMENTS . . .

PROCESSES & TECHNOLOGY C. S. CRONAN

## Radioisotopes Outlook:—



# New Supply Hastens Growth

## 1. First Kilocurie Plant Now On Stream

**Chemical process lowers radioisotope costs  
by recovering kilocurie quantities from nuclear wastes.**

We've made a start in the United States toward reaping some benefits from extremely hazardous radioactive nuclear wastes.

At Oak Ridge National Laboratory (ORNL), operated by Union Carbide Corp. for the U.S. Atomic Energy Commission, a new \$3 million pilot plant (F3P) now separates fission products (radioisotopes) from

fuel-processing waste, purifies them and packages them for use in medicine, industry and agriculture.

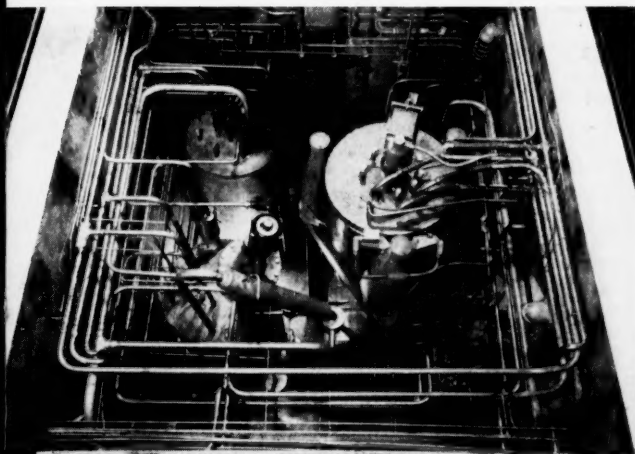
► **Debut for Kilocuries**—In effect, F3P opens a new era. Output from the plant makes available, for the first time, kilocurie quantities of long-lived fission products.

Able to handle up to 500 gal./day of radioactive waste acid

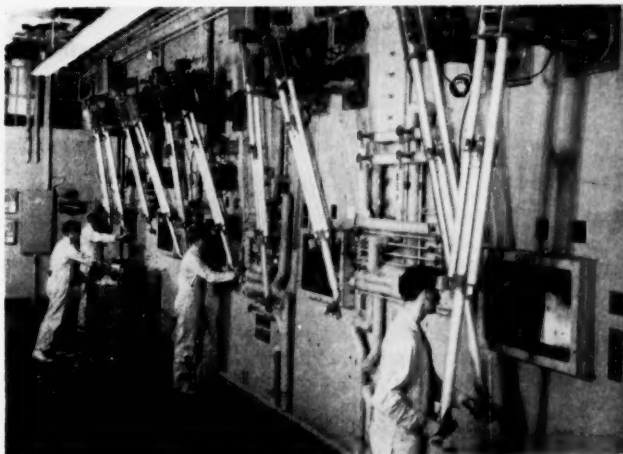
from Purex processing of spent reactor fuel elements, F3P is designed to recover 200,000 curies/yr. of cesium 137 as well as significantly large quantities of cerium 144, strontium 90, ruthenium 106, technetium 99 and promethium 147.

Already the increased supply of these products from F3P has dropped prices. Strontium 90, for example, now carries a \$10/

◀ **UNBUTTONED** cell block where ORNL converts nuclear fission wastes into crude long-lived radioisotope products.



▲ **SINGLE** cell contains precipitation tank, centrifuge and products tank, opens for direct maintenance.



**OPERATORS** control final remote purification processes behind shield via master-slave manipulators.

curie tag, down from a previous \$500/curie. And cesium 137 now costs only \$2/curie, a fraction of the former \$14/curie.

► **Fills Several Needs** — With kilocurie quantities now available at these reduced costs, industry can cash in on some of the advantages offered by long-lived isotopes (see utilization story, p. 100).

By the time that industry demands exceed F3P's production capacity, ORNL should have sufficient experience to upscale recovery of fission products to satisfy this demand and others stemming from the power reactor program.

For in addition to filling industry's growing need for radioisotopes, recovery of fission products may provide income to reduce the cost of producing power from nuclear fission. And by removing highly radioactive fission products from the nuclear waste, the recovery process will diminish the disposal problem proportionately.

► **Test Know-How** — It's too early to tell just how close ORNL has come to the ultimate process with the scheme which is now set up in its pilot plant.

Even so, it's obvious that the plant incorporates many lessons learned since investigation of fission product recovery first started at Oak Ridge in 1948.

Feed to the pilot-scale end of the plant is waste nitric acid solution laden with fission products from Purex or Redox reprocessing of nuclear reactor fuel elements. Evaporation concentrates this solution to a volume governed by chemical content, prior to separation and purification of the fission products.

► **Fractionate and Purify** — Then, a series of pilot-scale precipitation and crystallization steps segregates the various waste constituents. These fractions undergo lab-scale purification, metathesis to the desired source compound, drying and powdering (plating for ruthenium), pelletizing and loading into stainless steel or other metallic capsules. After sealing, these capsules are leak-tested, decontaminated and placed in a shielded carrier for delivery.

Each fraction precipitates as

the result of a stepwise adjustment in pH and other chemical conditions. In turn, this procedure separates ruthenium; strontium, cerium and promethium; and technetium.

Purification of these fractions involves various standard techniques, including reprecipitation, oxidation, distillation, solvent extraction, ion exchange, electrodeposition and calcination.

► **Inside the Cells**—Initial evaporation of feed takes place continuously in a 650-gal. evaporator tank fitted with a tantalum heating coil. Concentrates are withdrawn periodically from the bottom of the tank and fed to the first of four cells devoted to primary separation of the fission products by precipitation.

In each cell, precipitation is carried out in 250-gal. jacketed tank equipped with agitator. After precipitation, slurry feeds to centrifuge with 26-in. solid basket for separation of solids from liquid.

Effluent from centrifuge flows by gravity to collection tank; solids are washed, dissolved and stored in fraction tank.

► **Trapped by Crystals**—Filtrate remaining from the primary precipitation separations flows to a batch crystallizer containing a bed of ammonium alum. On heating to 195 F., the alum dissolves.

Then, as solution cools with agitation, recrystallization forms cesium-ammonium-alum crystals. Cooled solution flows to a second crystallizer where procedure is repeated to remove remainder of cesium.

Alum beds become progressively richer in cesium. About once a month they are dissolved in water. Cesium alum, separated from this solution by fractional crystallization, goes to final purification.

Crystallizer cells contain a total of two 500-gal. and two 125-gal. tanks fitted with coils and agitators. No holdup tanks are needed because only the liquid transfers from one tank to another while solids remain. Supernatant liquid is withdrawn through a screen which holds back the crystals.

► **Contain and Maintain** — To carry out the F3P recovery proc-

ess in the face of unusually intense radiation, ORNL evolved a design for F3P that provides a high degree of protection for operating personnel and extremely good equipment reliability. Processing units and areas can be decontaminated so that the staff can work directly on equipment when maintenance is needed.

The operation is housed in a concrete block structure 124 ft. long and 63 ft. wide. Individual concrete cells, in two separate banks contain process units.

Pilot scale concentration and primary separation of the fission products takes place in the nine-cell north bank; final purification and packaging of solids on a lab scale are handled in six-cell south bank through master-slave manipulators.

Suitable concrete shielding surrounds each cell while the tops are sealed with removable concrete blocks, 4 ft. thick. To facilitate decontamination, each cell is lined with Type 347 stainless steel. A slight vacuum on each cell and vessel assures that leakage of air will always be inward, venting to the central ORNL off-gas system.

► **Controls and Safeguards**—Except for two metering pumps, all process liquids are transferred by steam-jet syphons, vented to prevent suckback. While steam-jet condensate adds about 8% to solution volume, operating simplicity and freedom from maintenance make jets desirable.

Operations are controlled from second-story level atop cell block. Primary sensing elements inside cells transmit signals on liquid level, specific gravity, temperature, pressure and rotation to recorders outside the shield. Contact microphones on mixer and centrifuge drives indicate any departure from normal performance.

Analytical samples are withdrawn from process equipment through recirculating samplers to a process control cell atop the cell block. Using master-slave manipulators, operators then do the control analyses.

Five gamma monitors inside the building warn personnel if radiation is emitted accidentally.

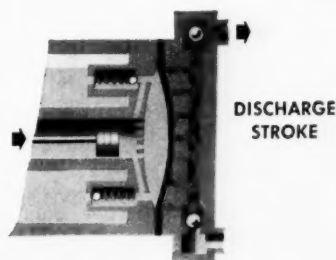
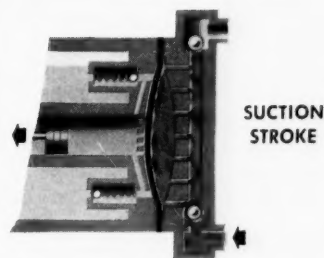
# This metering pump has NO STUFFING BOX

## **Lapp** **PULSAFEEDER** CONTROLLED-VOLUME CHEMICAL PUMP

Prevents Costly  
Leakage and Contamination

Lapp Pulsafeeder is a piston-diaphragm pump having a hydraulically balanced diaphragm and a closed hydraulic system. Its reciprocating piston action provides accuracy of positive displacement while the diaphragm isolates liquid being pumped from the pump's working parts. Eliminates need for stuffing box or running seal . . . prevents product leakage and contamination. Maintenance costs, too, are reduced to next to nothing. There are practically no repairs or replacement parts. All Pulsafeeder pump parts contacting liquid are of special corrosion-resistant materials. Pumping speed is constant; variable flow results from variation in piston-stroke length, controlled manually by hand-wheel, or, in auto-pneumatic models, by instrument air pressure responding to any instrument-measurable processing variable. Pulsafeeder capacities range from 585 ML per hour up to 24 gpm maximum flow and pressures from minus atmospheric to 6800 psig.

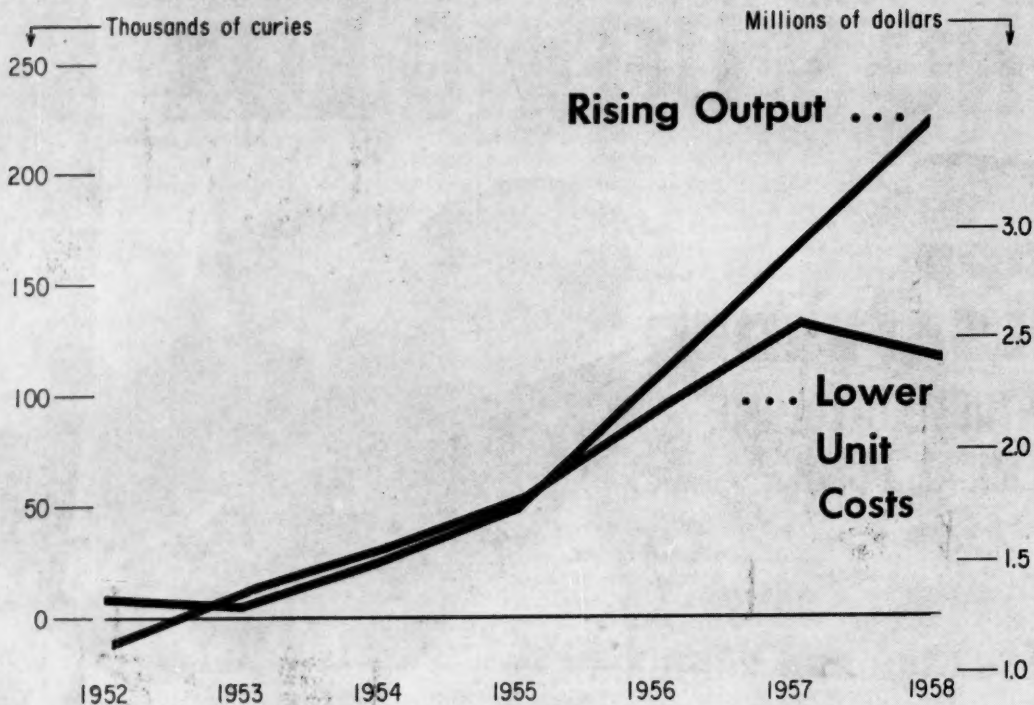
**WRITE FOR BULLETIN 440** containing typical applications, flow charts, description and specifications of models of various capacities and constructions and special leakage chart. Lapp Insulator Co., Inc., Process Equipment Division, 3612 Poplar St., Le Roy, New York.



# Lapp



Radioisotopes Distributed From Oak Ridge National Laboratory



# Radioisotopes

## 2. Industry Steps Up Isotope Utilization

How is industry using the rising output of lower-cost radioisotopes? Here is a rundown of who is doing what with these materials, where you can get them and price.

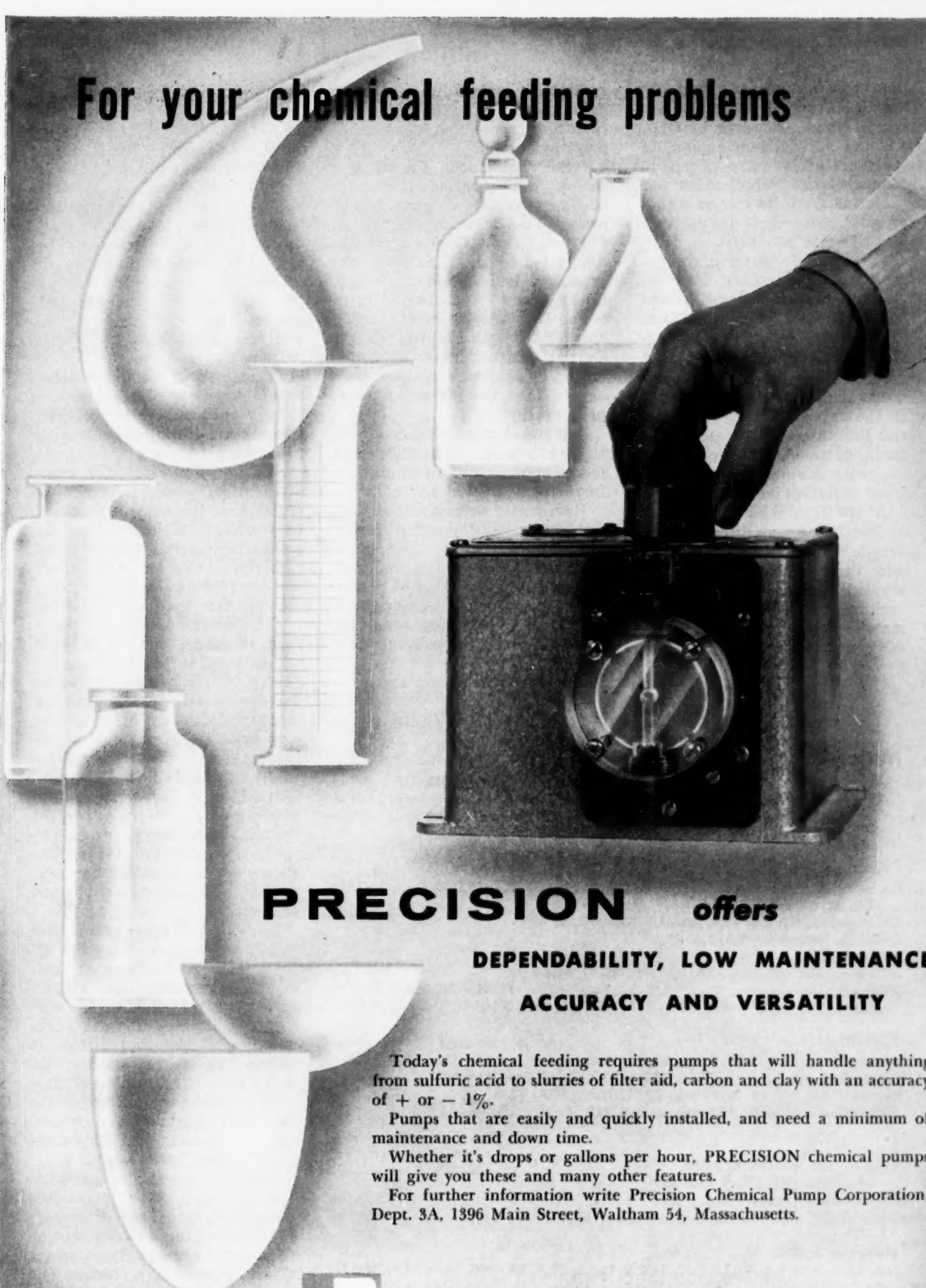
Radioisotopes, by the thousands of curies, are now finding their way into the chemical process industry. Last year nearly 250,000 curies was distributed from Oak Ridge National Laboratory by the U.S. AEC's Office of Isotope Development (OID). And with this

increase in sales volume and the development of a new separation process (see pp. 97), the unit price of radiation sources has dropped to a fraction of its level of just a few years ago.

Industry is reacting to the resulting increase in potential for commercial application of radi-

ation both by seeking new methodology and by establishing commercial facilities for radiation source production. And the burden of further technological development is shifted harder onto industry shoulders by recent Congressional reductions in the OID budget from \$6-mil-





For your chemical feeding problems

**PRECISION** offers

**DEPENDABILITY, LOW MAINTENANCE**

**ACCURACY AND VERSATILITY**

Today's chemical feeding requires pumps that will handle anything from sulfuric acid to slurries of filter aid, carbon and clay with an accuracy of  $\pm$  or  $-$  1%.

Pumps that are easily and quickly installed, and need a minimum of maintenance and down time.

Whether it's drops or gallons per hour, PRECISION chemical pumps will give you these and many other features.

For further information write Precision Chemical Pump Corporation, Dept. 3A, 1396 Main Street, Waltham 54, Massachusetts.

**PRECISION**



**CHEMICAL PUMP CORPORATION**

1396 Main Street, Waltham, Massachusetts

lion to \$4-million for next year.

► **A Spectrum of Efforts**—Contracts, issued this year by OI, are now subsidizing a complete spectrum of industry efforts to commercialize application of radiation from its role as a tool of basic research to its position in full-scale production.

For example, several companies are now probing into the mechanism of radiation-induced polymerization. At M.I.T. studies of low-temperature, ether-acetaldehyde polymerization aim at determining the basic process mechanism and the exact role of the catalyst. Battelle Memorial Institute is now researching basic polymerization processes, too, with a view to commercializing radiation ionization.

At the Textile Research Center of North Carolina State College, acrylic fibers are now irradiated and their improved properties studied. Radiation Applications, Inc., is inducing grafting of metallic salts onto the surface of organic polymers to yield new

rocket-age materials. Westinghouse is studying a high-level radiation route to ultra-clear polyethylene film.

► **Preserving Food, Too** — Research has revealed that radiation exerts a remarkable preserving influence on food. Curtiss Wright Corp. has been contracted by the U.S. Army to construct and operate a pilot, Co-60 food radiation unit, called Hi Intensity Food Irradiator (HIFI), at Lathrop, Calif. Curtiss efforts aim at determination of optimal radiation dosage of food for maximum safe preservation.

Somewhat more closely allied to the process industries are many applications of radiation in instrumentation and control.

Radiation determination of fluid level, density and material thickness is long in use, may find even wider application. Development by Los Alamos Scientific Laboratory of a new low-level gamma detector, sensitive enough to measure natural radi-

ation with precision practical for control applications, will permit use of radiation techniques where high-level radiation sources are not safe.

► **Radiation Controls**—As radiation detectors become more advanced, instrument manufacturers are following suit.

Aerojet-General Nucleonics is developing instruments that operate on the principle that certain radioisotopes emit radiation levels that vary with temperature and pressure. New instruments will permit temperature and pressure control in previously unavailable locations, by counting of radiation through process-unit walls.

Another development in process control, close to reaching fruition, is the measurement of very-small particle sizes by measuring their attenuation of radiation. Cement and other powder-product producers are viewing this with keen interest.

U.S. Bureau of Mines reports that radiation control is now widely used in the uranium industry. It's a natural; rates of flow and pulp density may be measured directly by counters. And detection of uranium losses in processing waste streams is easily detected too.

► **Crushing, Catalyzing and Tracing**—As radiation control techniques advance, other, entirely new radiation techniques appear on the industry horizon: radiation crushing and process catalysis.

Engelhard Industries and M.I.T. are now studying the effects of radioisotopes on catalysts, are discovering greatly increased reaction rates with use of radiation. Georgia Technological Research Institute is developing a radiation technique to ionize, thus break particle bonds of certain materials. Georgia's efforts focus on crushing of kaolin, an important paper-sizing material.

Tracing techniques advance, too. Russian steel producers have made good use of tracers in determining charge motion in blast furnaces, sulfur absorption in open-hearth charges and optimal slag quantity in both furnaces.

Here in the U.S., Isotopes, Inc., is employing tracers to de-

## Major Radioisotopes Now Readily Available

Checklist gives forms available, suppliers and prices.

Note that suppliers are keyed below, with bold faced numbers referring to listing at the end of this tabulation. Prices are \$/millicurie, "A" = prices available on application only.

### Cobalt 60

Co or Co<sub>2</sub>O<sub>3</sub> (unprocessed): 1,0.03-0.13; 3,0.12-0.20; 7,A; 11,0.15-0.33; 19,0.19; 32,A; 34,A; 39,A.

CoCl<sub>2</sub> (aqueous): 7,A; 11,A; 26,4000; 32,A; 36,14; 39,A.

Co(NO<sub>3</sub>)<sub>2</sub> (aqueous): 1,A; 7,A; 39,A.

Co(SO<sub>4</sub>): 39,A.

Miscellaneous solutions: 17,100; 34,A; 36,59; 41,54-85.

Radiographic sources: 1,0.06-3.5; 3,0.14-2.8; 7,A; 11,0.13-3.5; 14,0.03-0.76; 17,0.14-50.0; 19,0.11-4.20; 29,A; 32,0.005; 33,A; 34,A; 39,A; 41,0.12; 42,A; 43,1.1

### Tritium (Hydrogen-3)

Hydrogen gas: 1,A; 3,28; 11,29; 32,48; 39,A.

Water: 3,28; 4,1.5; 6,0.15; 11,39; 27,0.1-40; 35,0.05; 39,A; 41,0.1-4.0.

Encapsulated tritium: 3,\$98/unit; 32,\$183/unit; 39,A; 43,A.

Standardized sources (tritiated water): 24,0.25-6.98; 27,0.28; 41,110.

### Krypton-85

Krypton gas: 3,0.056; 32,0.066.

Encapsulated gas: 17,9.5-110; 43,A.

Standardized sources: 24,A.

### Iodine-131

Elemental iodine: 36,A; 39,A; 44,A.

Nal: 1,0.6-10.5; 2,A; 4,0.75-3.50; 11,0.5; 19,0.5; 23,A; 26,4000; 32,A; 34,A; 38,0.77; 39,A; 44,A.

KI: 39,A; 41,3.25.

Aqueous solution: 7,A; 36,0.50; 41,2.25.

Organic solution: 34,A.

Standardized KI solution: 28,36-196.



We at KENNEDY VAN SAUN  
are looking forward to  
the Chem Show with keen  
anticipation, for it is

always pleasant to talk to our old friends again,  
and to have the opportunity to meet new ones in the  
Chemical Industry.

This, then, is an invitation on behalf of our  
company and its management to stop at our booth,  
No. 1036, at the New York Coliseum during the week of  
November 30th.

We believe your visit with KENNEDY will be one of  
your most rewarding experiences of the entire  
Exposition. At our booth you will see complete  
KENNEDY plants pictured and described; you will find  
interesting information about all the process equipment  
made by KENNEDY; you will learn about the facilities,  
experience and achievements of KENNEDY's Engineering  
and Research Departments. And, our New York Offices  
are but minutes away from the Coliseum. Our executives  
and our Engineering Staff are ready to help you with  
any extra service or information you need in solving  
your process problems. Please feel free to make  
arrangements at our booth.

We look forward to your visit.

President

See our products on pages 407-411 in  
your 1960 Chemical Engineering Catalog.



**KENNEDY VAN SAUN**

MANUFACTURING & ENGINEERING CORPORATION

405 PARK AVENUE, NEW YORK 22, N.Y. • FACTORY: DANVILLE, PA.

Primary & Secondary Gyratory Crushers • Jaw Crushers • Roll Crushers • Impact Breakers • Hammer Mills • Rod & Ball Mills • Kilns • Dryers • Screens  
• Mechanical & Pneumatic Conveyors • Complete Crushing, Lime, Cement & Carbon Paste Plants. KENNEDY Research & Testing Service.

### Cesium-137

Solution: 32,A.

### Promethium-147

PmCl<sub>3</sub>: 32,0.18-0.32.

Encapsulated Pm: 17,0.23-140.0; 36,5-6; 43,A.

### Phosphorus-32

Red P: 39,A.

H<sub>3</sub>PO<sub>4</sub>: 1,A; 2,A; 7,A; 11,0.65; 32,1.10; 34,A; 36,2.80; 39,A; 44,5.00.

Orthophosphate: 36,A.

NaH<sub>2</sub>PO<sub>4</sub>: 26,400; 36,2.80; 39,A; 44,5.00.

K<sub>2</sub>PO<sub>4</sub>: 36,2.80; 39,A; 44,5.00.

### Carbon-14

Na<sub>2</sub>CO<sub>3</sub> solution: 1,A; 11,50-100; 39,A; 41,70.

Na<sub>2</sub>CO<sub>3</sub>: 6,90; 17,80; 25,80; 27,80; 35,80; 36,34-100; 37,70; 44,80.

BaCO<sub>3</sub>: 21,45; 27,28; 31,36; 32,22; 36,33.6; 37,28; 39,A; 41,28; 44,45.

Standardized beta sources: 17,1500; 24,296; 27,111; 36,560; 41,344.

### Strontium-90

SrCO<sub>3</sub>: 39,A.

SrCl<sub>2</sub> solution: 1,A; 4,4.8-14.5; 23,A; 26,400; 32,0.01; 39,A.

Sr(NO<sub>3</sub>)<sub>2</sub>: 39,A.

Industry sources: 1,A; 11,\$13/unit; 17,2.8-40.0; 36,230; 39,A; 43,A.

Standardized sources: 1,A; 24,24.7; 28,A; 34,A; 36,1870; 39,A.

## These Companies Sell the Above-Listed Radioisotopes

(Colored Nos. = U.S. Producers)

1. Atomic Energy of Canada, Ltd.; Ottawa, Ont.
2. Atomic Energy Establishment; Bombay, India.
3. Atomic Energy Research Establishment; Berkshire, England.
4. Abbott Laboratories; Chicago, Ill.
5. Argonne National Laboratory; Lemont, Ill.
6. Bio-Rad Laboratories; Berkeley, Calif.
7. Belgo Nucleaire; Brussels, Belgium.
8. Brookhaven Nat. Lab.; Upton, N. Y.
9. Buehler & Co.; Braunschweig, W. Germany.
10. Calif. Corp. of Biochemical Research; Los Angeles, Calif.
11. Commissariat a l'Energie Atomique; Gif-sur-Yvette, France.
12. Canadian Radium & Uranium Corp.; New York, N. Y.
13. Daiichi Pure Chemicals Co.; Tokyo, Japan.
14. M. Falk & Co.; Surrey, England.
15. Fleischmann, Burd & Co.; New York, N. Y.
16. Institut Pasteur; Paris, France.
17. Isotope Specialties Co.; Burbank, Calif.
18. Japan Atomic Energy Research Inst.; Tokyo, Japan.
19. Joint Establishment for Nuclear Energy Research, Lillistrom; Norway.
20. Merck, Sharp & Dohme; New York, N. Y.
21. Merck & Co., Ltd.; Quebec, Que.
22. Mound Laboratory; Miamisburg, Ohio.
23. Nuclear Consultants Corp.; St. Louis, Mo.
24. Nat. Bureau of Standards; Washington, D. C.
25. Nuclear Chicago Corp.; Chicago, Ill.
26. Nucleonic Corp. of America; Brooklyn, N. Y.
27. New England Nuclear Corp.; Boston, Mass.
28. National Physical Lab.; Middlesex, Mass.
29. Nuclear Systems; Philadelphia, Pa.
30. Nuclear Science & Eng. Corp.; Pittsburgh, Pa.
31. Orlando Research, Inc.; Orlando, Fla.
32. Oak Ridge Nat. Lab.; Oak Ridge, Tenn.
33. Picker International Corp.; White Plains, N. Y.
34. N. V. Phillips Roxane; Amsterdam, Netherlands.
35. Radio-Carbon Lab.; Van Nuys, Calif.
36. Radiochemical Centre, Amersham, England.
37. Research Specialties Co.; Richmond, Calif.
38. E. R. Squibb & Sons; New Brunswick, N. J.
39. Soyuzreaktiv; Moscow, Russia.
40. Schwarz Laboratories, New York, N. Y.
41. Tracerlab, Inc.; Waltham, Mass.
42. Technical Operations, Inc.; Burlington, Mass.
43. United States Radium Corp.; Morristown, N. J.
44. Volk Radiochemical Co.; Chicago, Ill.

termine nature of natural gas in storage, with hopes of better knowledge of underground storage techniques.

Krypton-85 is getting more attention lately as a tracer; Air Reduction Co. is developing handling and application techniques to promote its use. Kr-85 is now used to excite phosphors in self-illuminating lights and in detection of air pollution.

Tritium (hydrogen-3) is also finding wide spread application as a readily-available material, applicable for tagging all organic compounds.

► **Realistic Optimism** — With these and many other developments, application of radioisotopes looks promising.

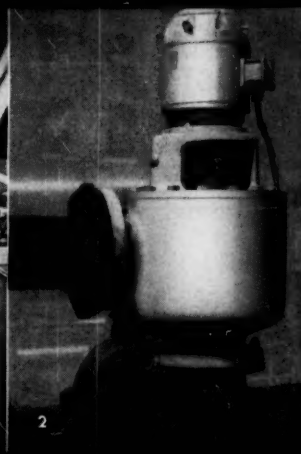
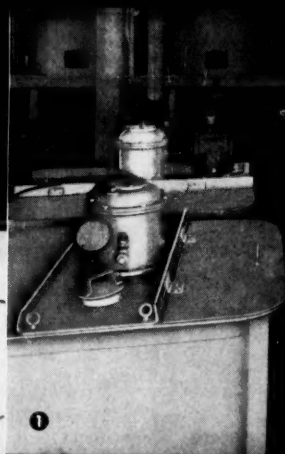
Cobalt-60 probably will remain the prime source of moderately penetrating gamma radiation for liquid density and level determination. For lower penetration beta attenuation: tritium, promethium-147, krypton-85 and strontium-90 probably will remain prime sources. Machine radiation offers higher penetration and dosage than is required for these purposes at an unwarranted higher cost.

Still another source, portable X-ray for thin film gaging, is under development by Picker and Armour Research. Gamma rays are reflected from a Sr-90 or Pm-147 target to yield a soft X-ray (5-200 kev.). Armour also is undertaking a study to confirm the feasibility of cesium-137 as a gamma and beta source for ionization, i.e., polymerization to compete with machine sources.

But radiation is still quite costly; cost/kw. for radioisotopes is prohibitively high for many purposes (*Chem. Eng.*, June 29, 1959, p. 44). Only for low-power, low-penetration or low-dose-rate applications are radioisotopes competitive with electron accelerators.

Industry, however, has declared its optimism by its penetration into the radioisotope business. Aside from hundreds of companies conducting radioisotope application research, more than 40 companies and agencies now market the principal radioisotopes, at a variety of prices depending on their chemical and physical form.





Improved Processing through Engineered Agitation

## HOW IMPORTANT IS GOOD FLUID MIXING IN YOUR PROCESS?

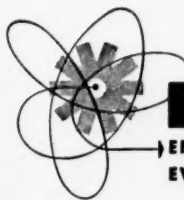
REGARDLESS OF HOW SPECIALIZED your particular processing needs are, good mixing can be the difference between "run of the mill" and maximum yields.

NETTCO MIXERS ARE PROCESS-RATED for optimum performance. Your particular process requirement is fully evaluated. And—it costs no more to get the full benefit of Nettco's wealth of agitation technology and broad application experience. Then—from design and pilot test to full process conditions, standard components are precision teamed to provide you with a Nettco mixer to meet your most exacting conditions. If good fluid mixing is vital to your process, then Nettco Engineered Agitation is vital to *you*!

PUT NETTCO ENGINEERED AGITATION TO WORK FOR YOU. From a full line . . . side drive, tank top, portable or tripod and unique continuous pipeline mixers, NETTCO can provide the answers to a wide range of mixing problems. See your NETTCO representative listed in Chemical Engineering Catalog or Refinery Catalog, or write for Bulletin 582, New England Tank and Tower Co., 87 Tileston Street, Everett 49, Mass.

**Booth #79**

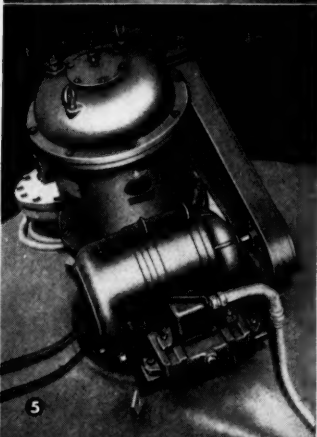
27th Exposition of Chemical Industries  
New York Coliseum



# NETTCO

ENGINEERED AGITATION SPECIALISTS  
EVERETT 49, MASSACHUSETTS

1. Paint blending with Nettco tank top mixers on 400 gallon portable tanks.
2. Nettco Flomix® in the continuous recycling of waste product to improve yield.
3. Variable speed pilot plant application of Nettco medium speed, propeller drive mixer.
4. Raw material batch blending with Nettco side drive mixer to assure uniformity.
5. 15 year old Nettco tank top mixer for synthetic rubber production with one of first double mechanical seals.







NEW cracking unit has been proved at Socal's Richmond, Calif., refinery.

## Isocracking Bids for the Gasoline Pool

Working catalytic magic, this new hydrocracking route makes high-octane blend stock, loses little to fuel gas.

Widespread interest followed California Research Corp.'s recent announcement of its new hydrocracking process, Iso-cracking (*Chem. Eng.*, Nov. 2, 1959, p. 19).

Generating the most interest

were mentions of a rugged new catalyst—"cheaper than conventional noble-metal catalysts"—and moderate conditions: 500-2,000 psig., 400-700 F. Normal cracking temperatures usually are 900 F. or above.

► **High Performance**—Combination of new catalyst and low-temperature operation upgrades refractory middle distillates (heavy cracked naphtha, light catalytic cycle oil), yielding over 100% by volume of valuable gasoline components such as isoparaffins, toluene and xylenes. Hence, after moderate reforming, this blend-stock product has a leaded octane number of 103-105.

Initial Isocracker investment is put at \$350-\$450/bbl. of reactor feed. Operating experience, to date, includes over 100,000 hr. in pilot plant and nearly one year of commercial operation at Standard of California's Richmond, Calif. refinery. Based on this experience, CalResearch reports total manufacturing cost runs \$33,000-\$35,000/day for a 7,000 bbl./day unit that includes hydrogenation and reforming.

► **Good Blend Stock Yields**—All-liquid product can be used for gasoline blending, but generally it's desirable to split product into light (C<sub>4</sub> to about

### From a typical feed . . . these gasoline stocks

Heavy cracked naphtha . . . C <sub>5</sub> -180 F. (28 vol. % C <sub>5</sub> +)	180-360 F. (72 vol. % C <sub>5</sub> +)
API gravity 36.7 . . . . .	81.7 . . . . . 46.1
Composition (liquid vol. %)	
Paraffins 25 . . . . .	81 . . . . . 22
Naphthenes 32 . . . . .	16 . . . . . 38
Aromatics 43 . . . . .	3 . . . . . 40
Octane rating (3 ml. TEL) 80.7 . . . . .	100 . . . . . 104.8*

### . . . with this product yield

	Wt. %	Vol. %
C <sub>1</sub> . . . . .	0.01 . . . . .	—
C <sub>2</sub> . . . . .	0.6 . . . . .	—
Isobutane . . . . .	9.4 . . . . .	14.0
n-butane . . . . .	4.0 . . . . .	5.8
C <sub>5</sub> + Isocrackate . . . . .	84.8 . . . . .	94.0

\*After platinum reforming to 91 vol. % C<sub>5</sub> +.

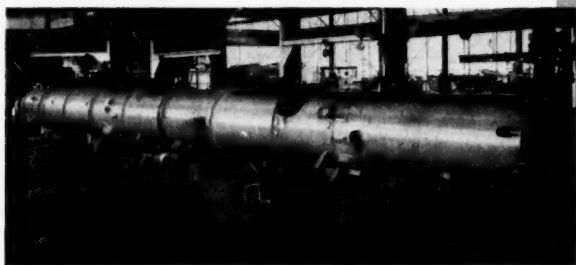
# 1 Dependable

## SOURCE FOR ALL PROCESS EQUIPMENT

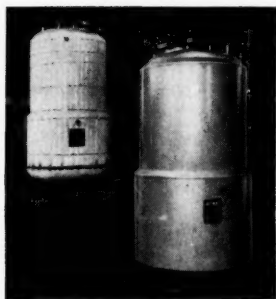
Acme experience relates to all major processes . . . extends from design and engineering to fabrication in all metals. Fully qualified for complete responsibility, Acme also welcomes the opportunity to collaborate with plant engineers or engineering consultants. From design of a complete process plant to fabrication of a single unit, Acme has consistently proven an economical and efficient source.



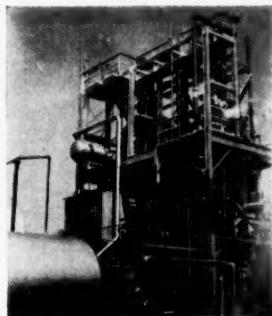
**WRITE FOR CATALOG E-60**  
48 PAGES INCLUDING  
VALUABLE HEAT EXCHANGE DATA



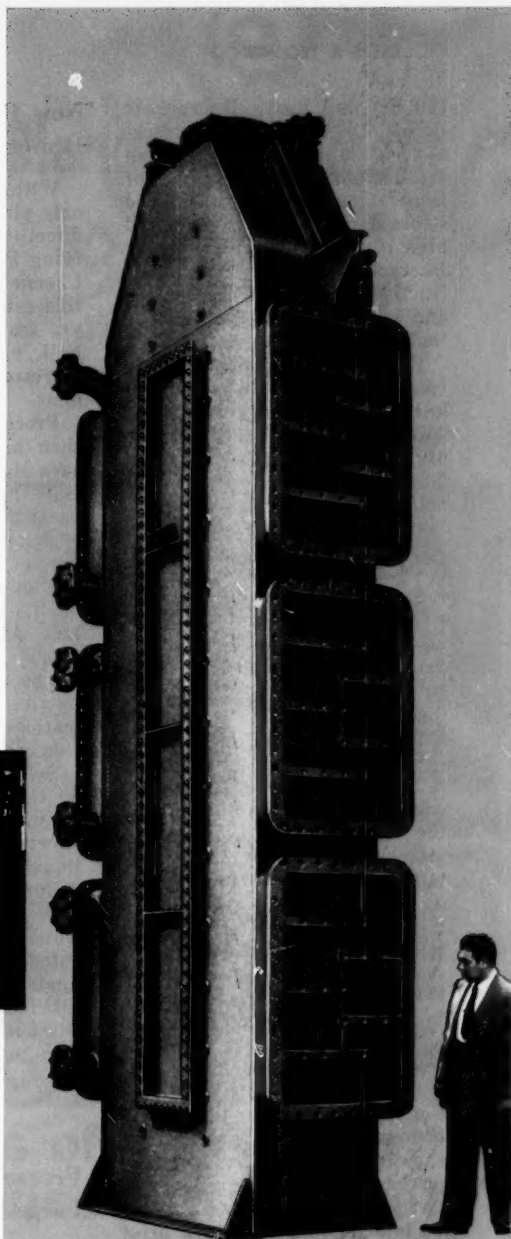
WEST BAY OF STEEL SHOP SHOWING 5'0" X 77'3" RIPPLE TRAY COLUMN OF STAINL. ST. IN PROCESS OF FABRICATION.



CULTURE ZULAUF TANKS.  
TYPE 304 STAINL. ST.-A.S.M.E.  
CODE AND SANITARY CONSTR.



TAR DEHYDRATION EQUIPMENT.



A.S.M.E. DRIP-TYPE CONDENSER, 2890 SQ. FT. SURFACE.  
MULTI-PASS STEEL CONSTRUCTION, 2'6" X 6'3" X 21' HIGH.



180 F.) and heavy Isocrackate (above 180 F.) Light Isocrackate, containing greater than equilibrium concentrations of isoparaffins, makes good blend stocks having low sensitivity and high road-octane ratings. Heavy Isocrackate is exceptionally attractive catalytic reformer feed and reforms up to 105-108 F-1 leaded octane number.

Various hydrocarbon classes (paraffins, naphthenes, aromatics) are distributed through the boiling range differently than in usual reformer feeds. Isoparaffins predominate in the lower boiling ranges where their octane numbers are highest. Naphthenes accumulate in the C<sub>7</sub>-C<sub>8</sub> molecular weight range and reform to toluene and xylenes.

► **Catalytic Sorcery**—Reaction mechanisms, rather than thermodynamic equilibrium limitations, govern the products of Isocracking. Hence some unusual things happen.

Light product fractions contain isoparaffins in production which are far on the iso side of thermodynamic equilibrium. Butane and pentane fractions contain isoparaffins in amounts to be expected from an isomerization process operating at room temperature. On the other hand, the methyl cyclopentane-cyclohexane fraction contains the former isomer in the high proportion expected from high-temperature isomerization.

One of the most striking reactions is that of the polymethyl benzenes. These demethylate rapidly, but instead of forming methane the methyl groups turn up as liquid isoparaffins.

► **Flow Outline**—Here's a brief sketch of Isocracking's operations:

Fresh feed and heavy recycle from the product splitter join hydrogen and are preheated against reactor effluent. Then more hydrogen, preheated in a furnace, is added, and the stream enters the top of the catalytic reactor.

After reaction stage, recycle hydrogen and fuel gas are taken off, remaining effluent going to a stabilizer which separates out C<sub>4</sub>'s and lighter. Bottoms go to a splitter which gives light Isocrackate overhead and a side-stream of heavy Isocrackate.

## New Route Now Leads to Dimethyl Isophthalate

With what it believes to be the only plant in the world to make dimethyl isophthalate by esterifying isophthalic acid, Montrose Chemical Co. is now turning out this ester on a multimillion-lb./yr. scale at its new Newark, N. J., plant. Product finds use in polyester resins, textiles and films.

Process is much more difficult than most other esterifications, says Montrose, because dimethyl isophthalate hydrolyzes in conventional acid-catalyst medium or water washes. Moreover, it's not very soluble in the usual solvents, so purification to final quality is no easy problem. Just how Montrose solved this, it won't say.

Though Montrose is reluctant to give out much process information, here's a probable reaction route:

Solid isophthalic acid (m. p., 80 C.) and methanol (in vapor form) are reacted in pressurized, Dowtherm-heated kettle. Some liquid ester in the reactor forms a slurry with the isophthalic and aids reaction. Methanol and water, taken overhead, are separated and the methanol used again. Dimethyl ester goes to distillation and then to final purification. Product is over 99.99% pure ester (more than 98.0% pure isophthalate).

## Freeze Process Eyed for Large-Scale Desalting

Freezing as a technique for desalting sea water has taken a long stride towards large-scale use. Last month Carrier Corp. placed on stream a 3½-story tall, 15,000-gal./day pilot plant at Syracuse, N. Y., to test out the economic and technical feasibility of producing fresh water from the sea by the company's freeze-separation process.

Dept. of Interior reports that it's seriously considering this process for its \$10-million salt water conversion program, under which five 1-million-gal./day desalination demonstration plants are being built in fresh-water-

thirsty areas of the U. S. Should Carrier's process prove out in the present pilot plant, it stands an odds-on chance of being named for the demonstration facility planned for a yet-undisclosed East Coast site.

Attraction of the freezing process over other desalination processes, notably distillation, is that it reduces corrosion and scale problems, has lower energy requirements. But one problem yet to be worked out: how to economically segregate fresh-water ice crystals from brine trapped between them. Carrier plans to move the pilot plant to a seaside site early next spring to concentrate on this problem.

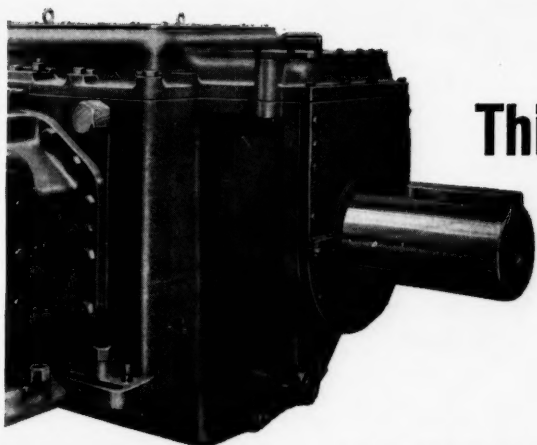
## Radiant Heat Key to New Solids Separation Route

A new solids separation technique, developed by International Salt Co. (Scranton, Pa.) with Battelle Memorial Institute (Columbus, Ohio) is now getting a commercial tryout ¼ mi. below the ground at the salt company's Detroit Mine. A two-step process involving selective radiation heating followed by separation of heated particles on a heat-sensitive surface, the technique's first job is to separate crude rock salt from impurities.

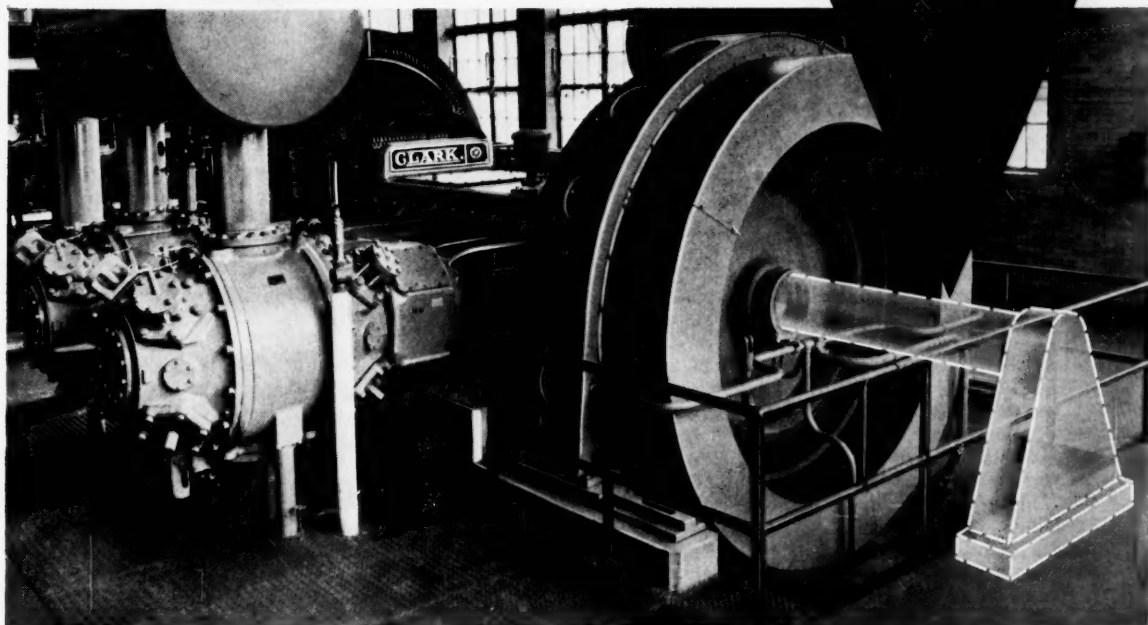
International says it's convinced that the radiant-heat separation method will handle this job more effectively and economically than the more widely used salt-upgrading technique of differential crushing and screening. Moreover, the company maintains that it will prove superior to more elegant separation processes such as gravity, electrostatic, pneumatic-table, air-resistance and electrical conductivity separations, and photoelectric cell sorting and froth flotation.

International believes the new process holds promise for a wide variety of solids separation applications. It plans to license the patented invention for use on other minerals besides salt, for a variety of chemicals, plastics, metals, food and agricultural products.

Process is based on different



**This Clark development  
eliminates  
outboard  
bearings**



## **In 10 years, in hundreds of installations, NEVER a motor end-bearing failure!**

Since Clark introduced *overhung rotor construction* in its Balanced/Opposed compressors a decade ago, hundreds of these air compressors have been built. Proof of the dependability of this design feature is the fact that not one motor end-bearing failure has occurred in over ten years.

Heavy duty crankcases and generously proportioned crankshafts and main bearings are the main reasons for this proved dependability. Here are additional advantages of Clark overhung rotor design:

**EASIER INSTALLATION**—Mounting the rotor directly on the crankshaft simplifies installation. Just align the stator to the rotor—that's all.

**LESS MAINTENANCE**—There is no outboard bearing to be knocked out of alignment. Motor bearing is integral with crankcase, lubrication is automatic. Self-centering of the rotor within the stator removes rotor weight from the bearing during operation.

**SIMPLER DESIGN**—One piece collector rings. Flywheel effect in most instances is completely built into the rotor thereby eliminating the flywheel.

**LESS FLOOR SPACE**—Close coupling reduces foundation requirements.

Overhung rotor construction is only one of many features found in Clark Balanced/Opposed Compressors. Review your requirements with your Clark representative for all the facts.

**CLARK BROS. CO.** OLEAN, NEW YORK

*One of the Dresser Industries*

**ENGINES • COMPRESSORS • GAS TURBINES**

**CLARK**





heat absorbing properties of different materials. For example, sodium chloride crystals are transparent to infrared heat waves while rock-salt impurities such as anhydrite, dolomite and shale absorb them.

In International's salt mine, crushed rock salt is passed under infrared lamps, then dumped on to a high-speed conveyor belt coated with a heat-sensitive resin. Relatively cool pure salt crystals fly off the end of the belt into a catch bin. But the warm impurities stick to the belt just long enough to leave end with less momentum and drop into a bin closer to the end of the belt, so affect the separation.

### Fluidized Bed Studies Probe Gas-Solids Contact

If you've ever wanted a better understanding of what goes on inside a fluidized bed, you can get it now from a paper given recently before a London meeting of the Institution of Chemical Engineers by K. P. Lanneau of Esso Research Laboratories, Baton Rouge, La.

Lanneau told of experiments that led to physical and mathematical models of gas-solids contacting in fluidized beds and its effect on chemical reactions. Experiments measured accurately the density and velocity of "bubble" and "emulsion" (or dense) phases of fluidization. Application of first-order reaction kinetics gave differential equations for reaction rate in terms of measured variables.

► **Contact Is Important**—Chief conclusion from the work is that, with poor contacting, it's difficult to reach high conversion levels because very high severity would be needed. Practically, this would mean much lower feed rates, more catalyst or higher reaction velocity. Much of the meat in this conclusion, however, is found in the extensive quantitative treatment.

For the bed used in the experiments (dia., 3 in.; bed height, 15 ft.), Lanneau reports "poor" contacting at reactor (superficial) gas velocity of 1.0 ft./sec., "good" contacting at 2.5 ft./sec.

and "excellent" contacting at 3.5 ft./sec. He cautions against a too-great operating severity to offset poor gas-solids contacting. Too-high severity works against selectivity, or product distribution, of a reaction, resulting in "overconversion" in the dense phase. Imperfect gas-solids contacting may limit selectivity in some fluid-bed catalytic reactions.

Yet, says Lanneau, in many cases the fluid bed has an advantage over the fixed bed, where gas flow approaches piston flow. Diffusion limitations and non-isothermal operation of fixed beds are frequently more detrimental to reaction selectivity than the non-uniform contacting in fluid beds.

► **Capacitance Probes**—Used in the experiments were small capacitance probes which gave high-speed measurements of point densities in the bed. Two probes, placed in the middle of the bed and 3 in. apart vertically, gave continuous point-density recordings which could also be used to measure linear velocity of bubbles. From such measurements on emulsion phases, dimensionless contacting parameters were determined which were used in reaction equations. Analog computer solved these equations.

### "Mechanical Cow" Wins Protein From Plants

A highly efficient "mechanical cow" has been sired to convert vegetable matter into protein. British Glues and Chemicals Ltd. has developed a process to extract protein from virtually any vegetable material, with a recovery efficiency of 95%, compared with 14% for the cow developed by nature.

Process uses shock waves set up in a flow of cold water to break open vegetable cells and free the protein without using heat. Previously, British Glues and Chemicals used the process to extract fat from bones and animal fat. (See *Chem. Eng.*, Feb. 1953, p. 118.) Slightly alkaline water is used because vegetable protein, unlike animal protein, dissolves in it.

The company is now negotiating for licensing plants in many parts of the world. United Nations and the Indian government have both expressed interest. Capital cost is estimated at \$2.50-\$3 per head of population to be served. Protein would cost less than 3¢/wk./person.

## NEWS BRIEFS

**Epoxidation:** Becco Chemical Div., Food Machinery & Chemical Corp., is now readying its new continuous epoxidation process for pilot-scale operation. In the process, an unsaturated oil (such as soybean oil), an organic acid and hydrogen peroxide are fed to the top of a packed column; epoxidized product and spent reagents are removed continuously at the other end. Higher purity and greater yields are claimed for the route.

**Gasoline additive:** Ethyl Corp. now has a new gasoline additive called Motor 33 Mix. A mixture of tetraethyl lead and methyl cyclopentadienyl manganese tricarbonyl, it can give up to three more octane numbers at 50% less cost than comparable refinery processes.

**Butadiene resins:** Enjay Co. is preparing to market commercial quantities of a new line of Buton butadiene resins based on butadiene polymers. Plants are now going up at Baton Rouge, La., and Bayonne, N. J., and will be ready in the second quarter of 1960. New plant capacity is pegged at about 10 million lb./yr., easily expanded to double that figure.

**Iraq pipeline:** Iraq Petroleum Co. has awarded a contract worth "many millions of dollars" to Anglo-American company, Turriff-Burden Ltd. to build 314 mi. of 30 and 32-in. pipeline in Iraq. About 50 mi. of pipeline will run between Rumaila and the Persian Gulf and remainder will be loop lines on the northern circuit between Kirkuk and the Mediterranean.



# Progress Report...

Pentanedione

## New chelates with 2,4-pentanedione

Metal chelates provide a means of deactivating or modifying the properties of a metal ion. Effective chelating agents with many industrial applications can be formed by the reaction of CARBIDE's 2,4-pentanedione (acetylacetone) with numerous metals and oxides.

**Pentanedione**, or acetyl acetone, usually forms oil-soluble metal derivatives, whereas most other chelates are water-soluble. Certain of these chelates may have possibilities as fungicides, insecticides, driers for paints and varnishes, and colors for inks. Titanium pentanedionate is indicated as an excellent cross-linking agent for cellu-

lose-derivative films and coatings giving them high solvent resistance.



Here are some other ideas... By adding a small amount of 2,4-pentanedione to a water solution of a coating-

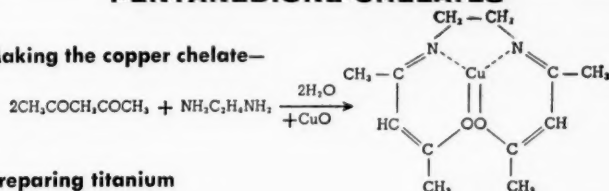
metal salt, hard and bright films can be laid on baser metals without an electric current. The discoloration of cyclic carbonate spinning solutions of acrylonitrile polymers can be inhibited by adding 0.1 to 3.0 per cent 2,4-pentanedione to the solution. Butadiene may be copolymerized with 2,4-pentanedione to produce an improved grade of synthetic rubber, suitable for industrial uses. A granular, water-insoluble, anion-active resin can be made with 2,4-pentanedione as the reactive ketone. The soluble metal derivatives of 2,4-pentanedione should be evaluated for their ability to increase the efficiency of internal combustion engines when added to lubricating oils.

**Remember, CARBIDE's 2,4-pentanedione** is fully miscible with most organic solvents. Its molecular weight of 100.1 also makes it interesting as an intermediate. For more information a technical bulletin containing many suggestions for applications of CARBIDE's 2,4-pentanedione is available. In it are listed physical properties, specifications and shipping information. For information on other CARBIDE chemicals, write for the 1959 Physical Properties of Synthetic Organic Chemicals—a comprehensive description of the properties and applications of more than 400 CARBIDE chemicals. Please write to Dpt. HE, Union Carbide Chemicals Company, 30 East 42nd Street, New York 17, N. Y.

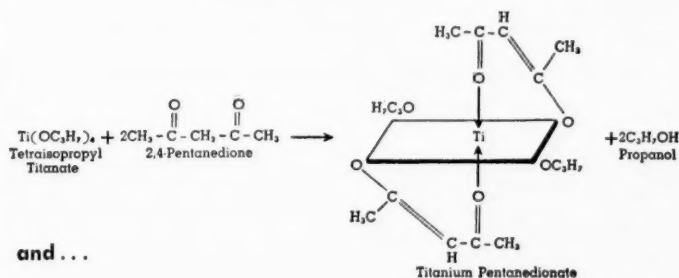
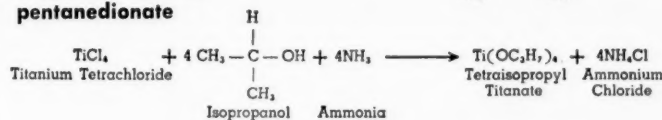
"Union Carbide" is a registered trademark of Union Carbide Corporation.

### PENTANEDIONE CHELATES

#### Making the copper chelate—

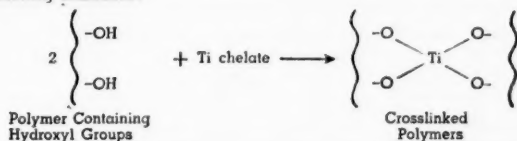


#### Preparing titanium pentanedionate



and...

The crosslinking effects of this material on a cellulose derivative polymer may be shown by the following illustration:



**UNION  
CARBIDE  
CHEMICALS  
COMPANY**

DIVISION OF

**UNION  
CARBIDE**

**CORPORATION**

DEVELOPMENTS ...

# CHEMICAL ECONOMICS

EDITED BY D. R. CANNON

Epoxy resin sales, million lb.

100

80

60

40

20

0  
1958 1959

1963

## Epoxy Resin Sales, Million Pounds

	1958	1959*	1963
Coatings	21.2	25.8	48.4
Tooling	2.5	3.6	6.2
Electrical	2.4	3.3	8.9
Laminating	1.3	1.8	3.9
Adhesives	1.2	1.7	3.7
Vinyl stabilizers & misc.	0.4	1.2	
Roads, flooring & construction†			12.0
Boats†			2.0
Piping†			3.0
<b>Total</b>	<b>29.0</b>	<b>37.4</b>	<b>88.1</b>

\* Based on first quarter of 1959.

† Included in other categories before 1963.

## Epoxies: A Boom at Last?

Loaded with talent but hindered by misdirected market development, epoxy resins are now getting the right kind of promotion.

The fellow who first said "Build a better mousetrap and the world *won't* beat a path to your door" might have had epoxy resins in mind.

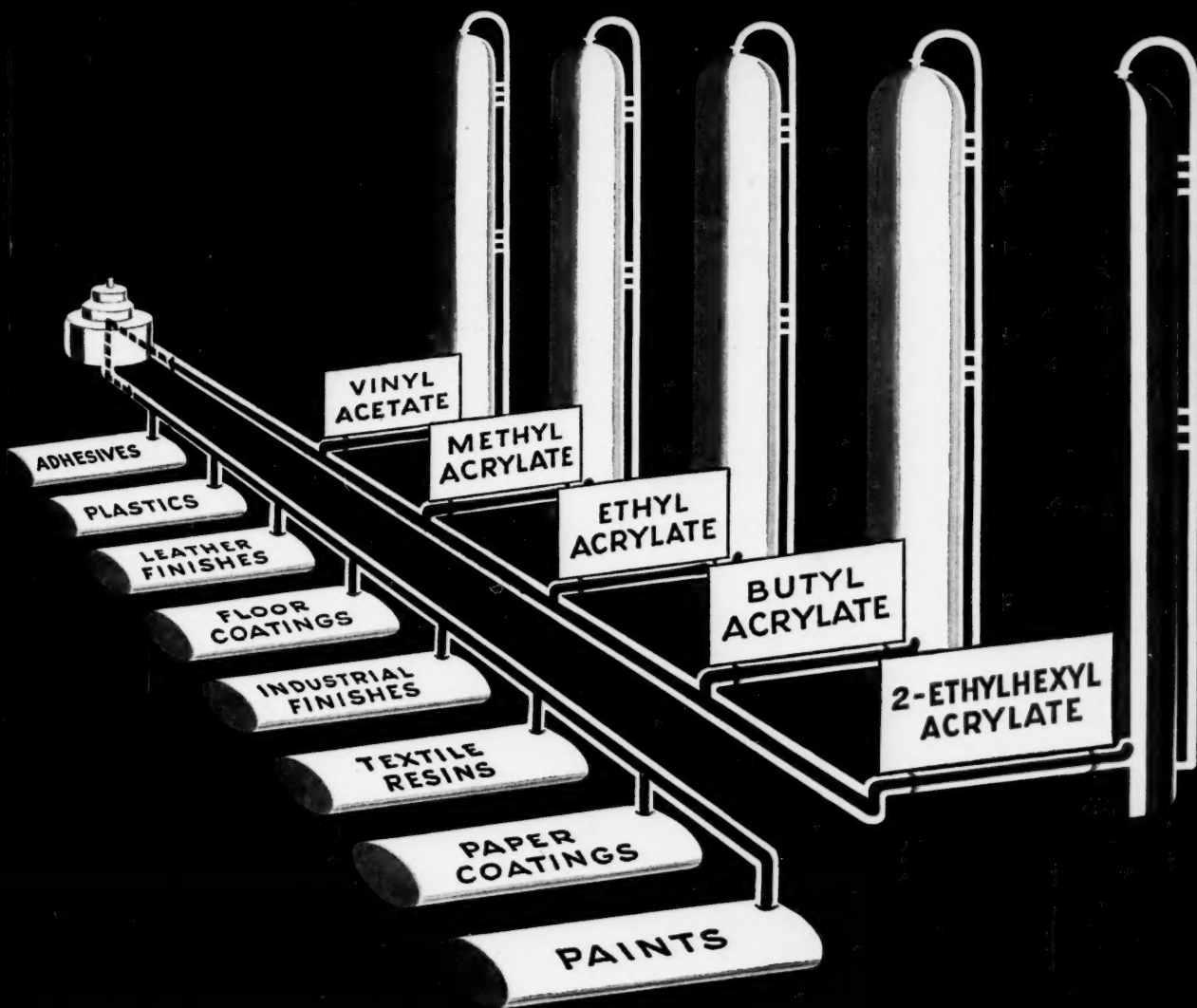
Here's a plastic-making material—a miracle material, if you will—with an exceptionally high strength-to-weight ratio, outstanding corrosion resistance, the closest thing yet to a "plastic steel." Yet today, 13 years after their first commercial production, epoxy resins have barely gotten off the ground. Less than 30 million lb. was sold last year,

rather small potatoes in the field of plastics.

But things appear to be looking up for epoxies. At least that's the view of a recent 220-page report by Harvard Business School students.\* Sales of nearly 40 million lb. of epoxy resins appear likely this year. By 1963, sales will have reached 90 million lb.—triple the score of 1958.

The authors of the report feel

\* Epoxy Resins: Market Survey and Users' Reference, available at \$18.50 from Materials Research, Box 363, Cambridge 39, Mass.



## 2-ETHYLHEXYL ACRYLATE

newest in the family of Celanese high purity monomers

Are you interested in the production of acrylic resins? Here's the latest in Celanese high purity monomers, an acrylate ester which provides superior plasticizing efficiency. 2-ethylhexyl acrylate offers improved economies and properties for many copolymer applications. This newest Celanese acrylate monomer is available to you now in commercial quantities to meet all your needs.

Like other Celanese monomers, you can use 2-ethylhexyl acrylate as a comonomer in the production of high quality emulsion paints, paper coatings,

textile sizes, backings and finishes, industrial finishes, polymeric wax bases and leather finishes. Its high purity permits rapid reaction, uniform polymerization, and high conversion of monomer to polymer.

For more information on Celanese 2-ethylhexyl acrylate, write to: Celanese Chemical Company, a Division of Celanese Corporation of America, Dept. 553-K, 180 Madison Avenue, New York, N. Y.

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.  
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.  
Celanese®

**Celanese**  
CHEMICALS

## Lineup of Epoxy Resin Producers

	Sales Million Pounds			Capacity Million Pounds	
	1957	1958	1959	Present	Soon
American Marietta*	2.5	2.8		2.5	2.5
CIBA	2.8	4.8	7.0	4.0	18.0
Devco & Reynolds	5.0	4.8	7.0	10.0	10.0
Dow Chemical	0.05	0.4	1.5	2.0	2.0
Reichhold Chemicals*		0.4	2.5	10.0	10.0
Shell Chemical	17.0	17.2	17.7	35.0	35.0
Union Carbide	2.9	3.0	4.4	3.0	15.0
Less Producer-to-Producer Sales		4.1	5.5		
<b>Total</b>	<b>27.8</b>	<b>29.0</b>	<b>37.4</b>	<b>66.5</b>	<b>92.5</b>

\* American Marietta and Reichhold used epoxy resin but did not produce it in 1957; their use appears in sales of other manufacturers.

that epoxy growing pains are easing, that producers and marketers have learned a hard lesson and that epoxies, their use-areas far from saturated, are ready to move at last.

But what's been holding them up so long?

First of all, there was a "miscalculation" on the part of forecasters as to the basis on which epoxies would be purchased. Estimators figured on a share of every market where epoxy performance would be outstanding. "Cost and handling problems were conveniently minimized."

► **Money Talks**—Most producers promoted epoxies on the basis of big performance and very little else. Many still do. Only recently have some producers demonstrated a realization that, miracle material or not, epoxies will be bought on the same basis as any other product: over-all cost, including materials, labor and handling equipment.

Thus, says the report, epoxies haven't penetrated markets where their chemical and physical properties are clearly superior to established materials—and worth a premium price—because producers and formulators don't possess the application technology to show the potential buyer how epoxies can save him money.

You might think that a lower price for epoxy resins would make the whole selling job a lot easier. It's true that a high price unaccompanied by convincing

evidence of over-all economic advantages, or a high first cost burdened by high handling costs, is a deterrent to sales growth. But a lower price isn't the real answer to epoxy market troubles.

► **Price Isn't Answer**—"It's the lack of application equipment and techniques and not the high price of epoxies that is keeping epoxies from penetrating some potentially large markets." (For example, epoxies cannot be used, for the most part, with high-production techniques.)

Even if producers were to cut prices, there's no guarantee the cuts would be passed on by the formulators to the end users, says the report. "... when the price of basic resin dropped from 80¢ to 67¢/lb. in 1958, there were few corresponding price cuts made by formulators."

The report estimates epoxy prices will drop only to 60¢/lb. for liquid resin, 50¢/lb. for solid resin (from today's 65¢ and 56¢/lb., respectively) by 1963.

► **Integration a Must**—At these prices, fully integrated producers (with respect to raw materials) will make 15-20% on their investment (after taxes), according to calculations by the authors of the report. Nonintegrated producers will glean less than 10%.

Ultimate rock-bottom price for epoxies: "probably somewhere in the neighborhood of 42¢/lb.," assuming a 50-50 production mix of liquid and solid resin.

Let's look at the future for

epoxies, end use by end use, as viewed by the Harvard Business School report.

**Coatings**—Consumption of epoxies will rise in this area to nearly 50 million lb. by 1963. This reflects a growth rate of 18%—just a shade higher than the expected growth rate for all paint sales because epoxies are still increasing their share of the total coatings market.

**Tooling**—6 million lb. of epoxies by 1963. This 20% growth rate prediction could turn out to be conservative if epoxies are utilized for tooling by other industries as they have been put to work by the aircraft industry.

**Electrical**—9 million lb. of epoxies by 1963. A 30% growth rate here is only a little higher than for the electronics industry, which is giving epoxies increasing attention.

**Laminating and Adhesives**—7-8 million lb. of epoxies by 1963. Improved formulations and application methods will give these end uses a higher growth rate than for epoxies as a class (20%).

**Highways**—Epoxy use in this market is waiting for completion of performance tests. If epoxy test patches prove successful, and application equipment and distribution channels are developed, sales of epoxies for road use should begin to show up in 1963—perhaps 2 million lb. Growth in this field "could well be faster than in almost any other epoxy field."

**Floors and Construction**—10 million lb. of epoxies by 1963. This area will produce big epoxy sales more quickly than road building. Market developers are looking for a way to sell to this market; they do not need test results or radical application developments.

**Piping**—Slow growth, rather than a breakthrough, is likely in this end-use area. If some of the field-coupling problems are overcome, a sales estimate of 3 million lb. of epoxies in 1963 could turn out to be an understatement.

"We can see possibilities that pipe will use as much epoxy resin in 10 years as does all of industry for all other epoxy uses."





## A MAJOR NEW SOURCE OF FRASCH

# SULPHUR

### **FIRST OFFSHORE SULPHUR MINE WILL TAP ONE OF THE WORLD'S LARGEST DEPOSITS**

Freeport's Grand Isle project—seven miles off the coast of Louisiana in 50 feet of water—is unique; it incorporates many firsts and it represents pioneering in the true sense. Its

real import, however, is that it extends far into the future the available reserves of low-priced Frasch sulphur.

At present, sulphur is in good supply. But, since reserves cannot be found at will nor mines turned on like faucets, we must develop sufficient productive capacity well in advance to meet the much greater demand for sulphur anticipated in the coming years.

Our reserves are the highest in our forty-seven-year history—certainly an assurance to our customers of an unfailing supply for their long-term needs.

## **FREEPORT SULPHUR COMPANY**

161 East 42nd Street, New York 17, New York



## Consumer Wraps Now Come in PVC



**CLEAR HOUSEHOLD WRAP**, to compete with Saran, is one of new polyvinyl chloride film products.

**New combination of strength and thin gage opens new mass markets to polyvinyl chloride film.**

Literally and figuratively, Reynolds Metals Co. is casting polyvinyl chloride film in a new role: Protective, decorative, see-through wrappings (1) for housewives and (2) for packagers of consumer products. The maneuver should also put a new face on Reynolds itself. Long known for aluminum and metals, it's now courting widespread identification with plastics.

Films are oriented by biaxial stretching to a minimum  $\frac{1}{2}$ -mil thickness. Both orientation and the thinness of the gage are unique for PVC film and add the properties necessary for wrapping applications: strength, drapability, clingability. Combination of good physical characteristics and thin gage, made possible by orientation, are expected to allow Reynold's films to compete

price-wise with most packaging films to be found on the market today.

Flag carrier in Reynolds' march on the plastics Who's Who is a clinging film called Reynolon Wrap, aimed at competing with Dow's polyvinylidene chloride-based Saran Wrap, a blown film, also stretch oriented. Reynolds describes its film as easier to handle, stronger, tighter sealing.

For industrial packaging of consumer products, Reynolds offers a semi-rigid oriented PVC film in  $\frac{1}{2}$ -mil and 1-mil gages. Combination of clarity and outstanding strength (high tensile and impact strength, elongation, puncture and tear resistance and good low temperature flexibility) make it a candidate for applications where, heretofore, only polyester film has been satisfactory. According to Reynolds, its film will be especially valuable as a skin-tight direct overwrap, as a box overwrap and as a bundling material.

In addition to durability, it has brilliant clarity and is priced as low as 33¢/1,000 sq. in. Orientated PVC can be heat-shrunk by hot air or hot water and can be heat-sealed at temperatures below those required for shrinking. The film can also be solvent-sealed.

Only other company casting vinyl film is Union Carbide Plastics. However, thickness ranges from 2 to 8 mils; major use is in skin packing where the film is formed by heat, directly over a product. Reynolds, however, casts its new films from a solution

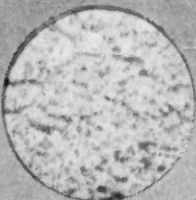


**CASTING FROM SOLUTION** contributes to producing gages of unprecedented thinness for commercial polyvinyl chloride films.

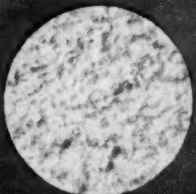
# OUTSTANDING FORMS!



**FLAKE.** Recently developed for users requiring a product that always flows freely. Dissolves rapidly. No extra cost!



**REGULAR GRANULAR.** Fast dissolving, yellow-white, crystalline material for a wide range of applications.



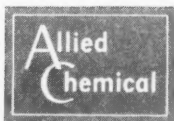
**45-S GRANULAR.** Same as regular granular form, but preferred when greater storage life is desired.

## OUTSTANDING PRODUCT! U.S.P.

All three forms of anhydrous Solvay® Sodium Nitrite are top quality — U. S. P. All are available in 400-lb. and 100-lb. fiber or steel drums and 100-lb. bags.

# SOLVAY SODIUM NITRITE

Sodium Nitrite • Caustic Soda • Calcium Chloride • Chlorine • Chloroform  
Caustic Potash • Potassium Carbonate • Sodium Bicarbonate • Soda Ash  
Ammonium Chloride • Methyl Chloride • Ammonium Bicarbonate • Vinyl Chloride  
Methylene Chloride • Cleaning Compounds • Hydrogen Peroxide • Aluminum  
Chloride • Mutual® Chromium Chemicals • Snowflake® Crystals • Monochloro-  
benzene • Ortho-dichlorobenzene • Para-dichlorobenzene • Carbon Tetrachloride



**SOLVAY PROCESS DIVISION**  
61 Broadway, New York 6, N. Y.

SOLVAY branch offices and dealers are located in major centers from coast to coast.

**SOLVAY PROCESS DIVISION**  
**ALLIED CHEMICAL CORPORATION**  
61 Broadway, New York 6, N. Y.

DR-119

Please send without obligation sample or samples as follows:

- ☐ Solvay Flake Sodium Nitrite  
☐ Solvay Regular Granular Sodium Nitrite  
☐ Solvay 45-S Granular Sodium Nitrite  
☐ Include prices and name of nearest dealer

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Phone \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_



### Seed-in-Slurry of Pulp Permits Spray-Planting of Sod

Field testing of a new process to quickly establish sod on embankments and levees is under field test, above.

It consists of mixing specially prepared wood pulp, grass seed and fertilizer in the proper proportions into a water slurry and applying it evenly over the slopes with a high-speed air

blast. The mixture dries quickly to form a papier-mache-like blanket, which encourages seed germination and protects the slopes from erosion.

An experienced operator can spray-plant 0.4 acres in 10-12 min. from a 1,500-gal. slurry tank.—International Paper Co., Mobile, Ala. 118A

which, along with orientation, accounts for the thin gages.

Too, Reynolds' is the first film casting operation to use Du Pont's tetrahydrofuran as a solvent. (Reynolds' plastics operations are centered in Grottoes, Va.) Though somewhat more expensive than alternatives such as methyl ethyl ketone, it dissolves the resin formulations better and faster, allowing process economies.

A third new film introduced by Reynolds is based on polyvinyl alcohol. A water soluble variety, it is already in use as a unit-of-use package for a household detergent. According to estimates advanced by the Borden Chemical Co., who are expanding their facilities for producing polyvinyl alcohol film, its consumption for single-use soap packaging alone should reach the 20-million-lb./yr. mark within five years. Packaging of dyes, insecticides, paints and fertilizers are considered likely future applications.—Reynolds Metals Co., Richmond, Va. 116A

### Butadiene Polymers

Now available in quantity, the resins have established use in plastics, coatings.

Commercial quantities of a new line of butadiene polymers will be available in the second

quarter of 1960 from new facilities at Baton Rouge and at Bayonne, N. J.

Called Buton resins, they have been in active market development for several years, designated as C-Oil and butoxy resins. Now they have established uses in the formulation of industrial baked primers, baked top coats, can liners, and other surface coating applications.

Other grades of the Buton resin are of interest to fabricators of reinforced plastics because of chemical resistance and electrical characteristics and because of the economic advantage of low density.—Enjay Co., New York. 118B

### Antiknock Compound

Billed as greatest advance in technology of such compounds since TEL.

A new antiknock will provide octane numbers at a lower cost than is available either from TEL alone or from refinery processes in fuels in which it is most responsive.

Known as Ethyl Antiknock Compound-TEL-Motor 33 Mix, it consists essentially of a mixture of tetraethyl lead and methylcyclopentadienyl manganese tricarbonyl. It is based on patents obtained by Ethyl Corp.

### —Newsworthy Chemicals—

Page Number is also  
Reader Service Code Number

PVC film acquires thin, strong shape for wrapping uses...	116A
Pulp slurry permits spray-planting of sod.....	118A
Butadiene polymers, now available in quantity.....	118B
Antiknock agent said to approach TEL in importance...	118C
Plastics cracking traced to source via new technique...	120A
Stabilizer ups heat and light resistance of polyolefins...	120B
Weed killer penetrates to deep roots.....	120C
Dithiooxamide and six derivatives available.....	120D
Organic titanium compounds graduate to large scale...	120E

—For more details, use Reader Service Card—

Milestones in Hydride Chemistry

# MHI DROPS SODIUM BOROHYDRIDE PRICE!

**\$19.90 PER POUND** is the new price for high-purity MHI sodium borohydride, in quantity lots of 5,000 pounds. This is the lowest price ever offered for 98% pure sodium borohydride powder. Increased commercial use, perfected processing techniques, and expanded production facilities have made this new price break-through possible. Remarkably stable, sodium borohydride is easily used with complete safety in standard equipment. It is shipped in polyethylene-lined, 55-gallon drums.

The new price should put sodium borohydride within the economic reach of many processors looking for a powerful, high-yield reducing agent for aldehydes, ketones, peroxides and acid chlorides. Others can now take advantage of its proven effectiveness for continuous fixed-bed, in-stream "clean up" of carbonyl or peroxides from gaseous or liquid olefins, diolefins, alcohols and glycols, amines and amino-alcohols, ethers and polyethers, acrylonitrile and chlorinated hydrocarbons. For producing better

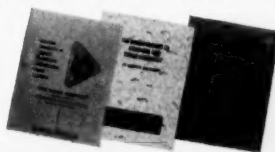
vinyl foams, sodium borohydride offers versatile and inexpensive process possibilities using simple equipment.

This new price combined with the reducing power and flexibility of sodium borohydride may well justify your immediate inquiry for complete information.

Do you have  
these new  
technical  
publications?  
If not, write today.

For technical  
service . . .

Contact MHI now. Over 20 years' experience, plus the recent assignment of exclusive patent rights for the manufacture of sodium borohydride and its organic reduction applications, qualifies MHI as an exceptionally helpful source for technical service.



PIONEERS IN HYDRIDE CHEMISTRY  
***Metal Hydrides Incorporated***

1116 W. CONGRESS STREET, BEVERLY, MASSACHUSETTS





### Color Patterns May Tell How Plastics Crack

Color patterns that appear under certain conditions on the surface of colorless plastics when samples are stressed to the breaking point are now under study. As a crack progresses through a sample of polymethyl methacrylate, for example, bands of color appear on the cracked surface. In the photo, James P. Berry of GE Research Laboratory holds a jig in which samples are stressed; in the background, a typical pattern.

Why and how color appears on

the surface of a colorless plastic remains to be explained. The colors might be produced by variations induced in the molecular structure of the plastic as the crack progresses. The patterns, in turn, may reflect differences in the magnitude of such structural changes in different areas. Tracing the color to its source should provide valuable new information on how plastics break, how they can be strengthened.—General Electric Research Laboratory, Schenectady, N. Y. 120A

and is now being made available to refiners in commercial quantities for motor fuels.

As a supplement to TEL, the manganese compound was found to have greatest effectiveness in those hydrocarbons and gasolines in which TEL shows good effect. It is most effective in alkylates and paraffinic naphthas, moderately effective in olefins, least in aromatics.

Compared to TEL alone, 3 ml. of the new mix can add up to 3 octane numbers to gasolines. It can supply these additions at a cost that can be as much as 50% less than the comparable cost of refinery processing.

It will permit many refiners to use less severe catalytic reforming, thereby increasing gasoline yields/bbl. And it will encourage greater use of natural gasoline or virgin light naphthas thus contributing to gasoline blends with improved road antiknock performance.—Ethyl Corp., New York. 118C

### BRIEFS

**Stabilizer for polyolefin and polyvinyl types of plastics** are new uses found for Voidox 100%, a white, waxy, fatty-

acid modified derivative of a substituted phenol. Introduced originally as a food-grade antioxidant, it increases both light and oxidation resistance of plastics, improves their flexibility in heavy sections, when used in percentages from  $\frac{1}{2}$  to 1%.—Guardian Chemical Corp., Long Island City, N. Y. 120B

**Weed and brush killer**, developed especially for control of deep-rooted weeds and hard-to-kill weed trees, penetrates soil as readily as the water it is dissolved in. Called Urab, it contains the killing ingredient 3-phenyl-1, 1-dimethylurea trichloroacetate, which is soluble in water.—Allied Chemical Co., New York. 120C

**Dithiooxamide** and six of its N,N'-disubstituted derivatives are now available in developmental quantities. Commercially new sulfur-bearing organic compounds, the dithiooxamides show promise for use as pigments, metal sequestrants, duplicating processes, and organic intermediates. —Mallinckrodt Chemical Works, St. Louis, Mo. 120D

**Six organic titanium compounds** which have already found uses in making industrial adhesives, water repellents, resins and other chemical products are now available in commercial quantities. Four ortho esters and two of the more stable chelates of titanium are available, although the company can produce on demand a much wider variety of compounds, including acylates.—Du Pont Co., Wilmington, Del. 120E

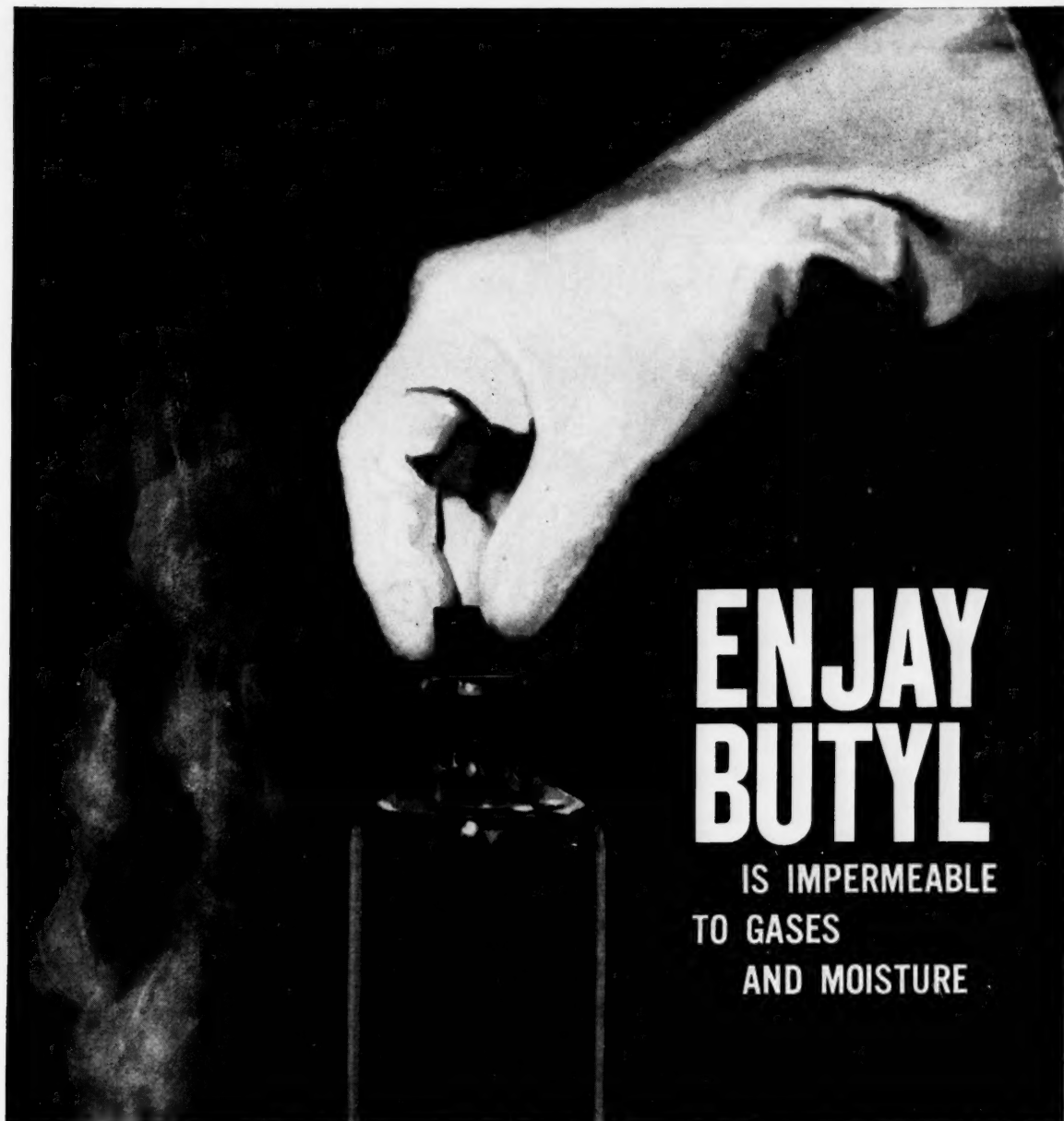
### For More Information . . .

about any item in this department, circle its code number on the

### Reader Service

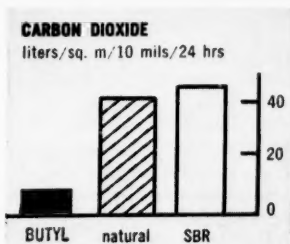
postcard (p 247)





# ENJAY BUTYL

IS IMPERMEABLE  
TO GASES  
AND MOISTURE



The impermeability of Butyl to carbon dioxide is demonstrated when compared with natural rubber and SBR.

Enjay Butyl rubber offers unmatched impermeability to gases, moisture and moisture vapor. Many applications prove Butyl retains air pressure 8 times better than natural rubber. Butyl outperforms natural and synthetic rubber in such applications as inner tubes, jar and bottle seals, inflatable sporting goods, window seals, hoses... wherever an impermeable barrier is required.

*Butyl also offers* outstanding resistance to sunlight and weathering... chemicals... heat... abrasion, tear and flexing... superior damping and unmatched electrical properties.

*Find out how versatile, low-cost Butyl can improve your product. Call or write your nearest Enjay office.*

EXCITING NEW PRODUCTS THROUGH PETRO-CHEMISTRY

**ENJAY COMPANY, INC.**, 15 West 51st Street, New York 19, N.Y.

Akron • Boston • Charlotte • Chicago • Detroit • Los Angeles • New Orleans • Tulsa



DEVELOPMENTS . . .

## PROCESS EQUIPMENT

EDITED BY C. C. VAN SOYE



### "Oh Bury Me Not, On the Lone Prairie" . . .

. . . does not apply in the case of this 8-in. Unistrength aluminum pipeline, being readied for the ditch at Point Comfort, Tex. Buried without protection, the piping costs only 4% more than coated and wrapped steel lines of comparable size. According to producer Alcoa, aluminum's high

corrosion resistance and non-sparking quality quickly overcome the small price differential. Unistrength is a seamless product having heavier walls at pipe ends for more efficient welds. *Chem. Eng.*, Nov. 2, 1959, p. 122 gives details.—Aluminum Co. of America, Pittsburgh, Pa. 122A

### Radiant Heater

No costly warm-up delays.  
Cools very quickly.

An industrial radiant heater, developed for drying, baking, curing and preheating applica-

tions, reaches full heating capacity of 800 to 850 F. within 3 min. Average output is 20 w./sq. in. of working surface.

Designed for horizontal mounting above or below a process line, the heater emits high-efficiency, long-wave in-

frared radiation from wire coils enclosed in tubes of 96% silica glass. A triple reflector system directs 85 to 90% of available radiation onto the work. The housing consists of three layers: two of aluminized steel, and a middle layer of glass-fiber insulation.

Engineered for low-cost installation, the unit comes equipped with junction box, leads and mounting hangars. Reflectors can be removed for cleaning. — Corning Glass Works, Corning, N. Y. 122B



### Batch Mixer

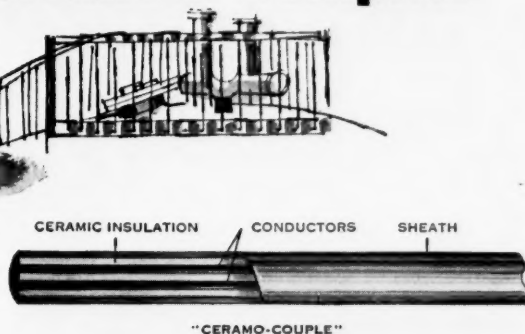
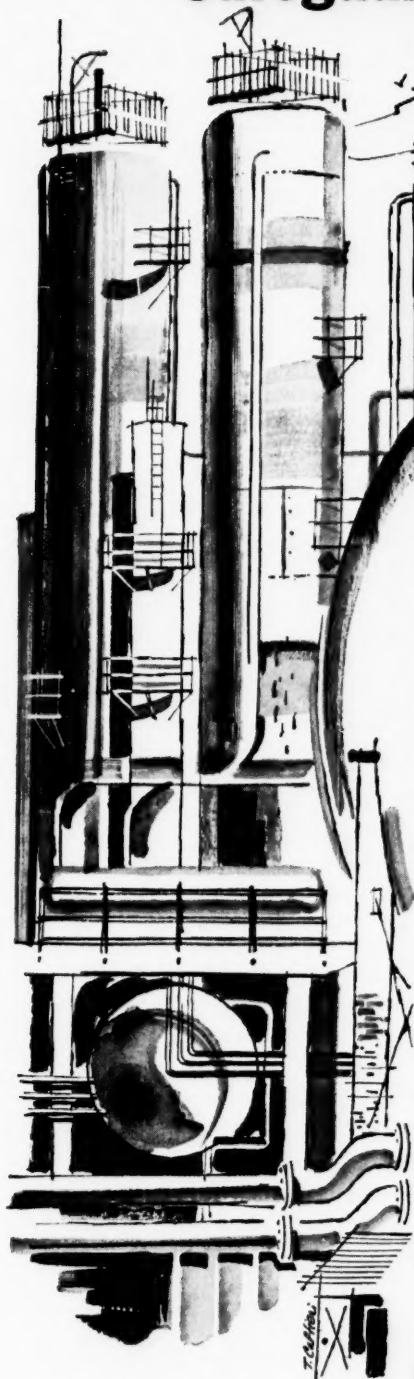
Easy-to-clean unit requires little maintenance.

Engineered for any application requiring accurate blending of dry, free-flowing materials, the MacLellan batch mixer employs the principal of repeated division and pyramiding of materials to obtain a uniform mixture.

Materials charged into the lower compartment are divided by separators into six batches. Rotation of the drum carries feed above the axis of the mixer until it falls by gravity, discharging successively from two

# 1,000 Ceramo<sup>®</sup> Thermocouples

## Safeguard New Multi-Million Dollar Petrochemical Complex



At the Lake Charles, La. plant of Petroleum Chemicals, Inc., controlling temperatures from 300° below zero to over 2000° F. is critical. Thermocouples installed throughout the plant must withstand corrosive atmospheres, high pressures, and high velocity gas streams. Despite this "rough treatment", these thermocouples must be long-lived to cut costly down-time. They must be accurate and sensitive to eliminate the possibility of malfunction.

Small temperature deviations might upset a complete process—without reliable sensing elements, untold damage could result.

To assure protection of their installation—including the world's largest ammonia plant reactor, Petroleum Chemicals, Inc., chose Thermo Electric "CERAMO-COUPLES". They particularly like "CERAMO" because they have been able to depend on the inherent superiority of the ceramic insulated, metal sheathed thermocouple wire, for long in-service life, and continuous accuracy.

"CERAMO", introduced by Thermo Electric in 1951, is now recognized as an industrial standard for temperature sensing elements . . . many thousands of "CERAMO" thermocouples are being used in installations throughout the world.

Years of specialization in the design and manufacture of "CERAMO" thermocouples enable us to offer a product of consistently high quality. Our experience with thousands of specific applications has given us a vast knowledge of the product's proper use in industry.

Find out how "CERAMO" can help improve your process controls . . .

**Write for catalog 34-E**

**Visit us at the Chemical Show  
Booth No. 817**

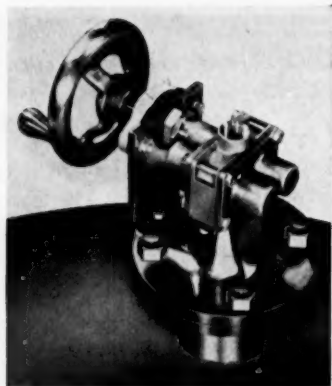
**Thermo Electric** CO., INC.

SADDLE BROOK,  
NEW JERSEY

In Canada: THERMO ELECTRIC (Canada) LTD., Brampton, Ontario

pockets at a time, pyramiding at the other end of the drum. This operation repeats each half revolution, giving 60 complete separations and mixes in five revolutions. Time of five revolutions—1 min.

Sizes vary from 5 qt. for laboratory models to 160 cu. ft. for production purposes. All sizes are offered with a motor drive, using single-reduction, right-angle gearhead motors. Materials of construction range from stainless steel to copper.—**Daffin Mfg., Lancaster, Pa.** 122C



### Viscous-Media Valve

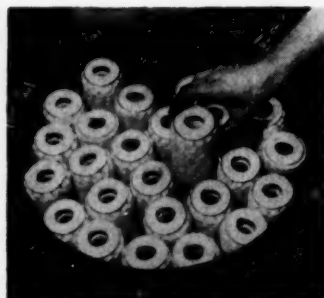
**Energizes and controls highly viscous materials.**

Called Gear-Vac, a new valve can handle small flows of media with viscosities to 250,000 SSU. The unit provides positive, linear, bubble-free flows that are measurable and reproducible. Neither heat nor external pressurizing is required.

Gear-Vac valves provide such performance by creating a vacuum and causing atmospheric pressure to collapse the viscous mass into the vacuum pocket. This assures constant supply to the gear chamber for positive dispensing with metering accuracy within  $\pm 2\%$ . Instead of restricting passage of media, the unit develops reduced flows by correspondingly decreasing the rpm. of the gear mechanism.

A handwheel serves as the motive force for manual operation. For remote or process-controlled operation on constant or

cyclic flows, a motor may be used. Discharge port is  $\frac{1}{4}$  in. Materials of construction vary with application.—**Eco Engineering Co., Newark, N. J.** 124A



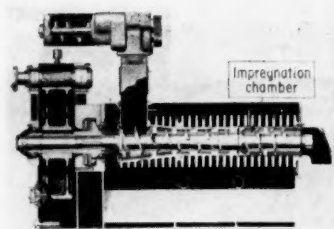
### Filter Cartridge

**Synthetic-fiber felt assures close size control.**

Felt made of uniform, chemically crimped rayon is the filtration medium in a new line of liquid filter cartridges. Carrying the trade mark Feutron, the cartridges achieve precise control throughout a range of 5 to 75 microns.

High solids capacity and greater filtration area of Feutron units lengthen the time between replacement shutdowns. In one application, a paint maker whose normal capacity with previous cartridges was 800 gal. between shutdowns, filtered 5,200 gal. with the new cartridges.

At present, the product comes in a single size to fit either the  $9\frac{1}{2} \times 2\frac{1}{2}$ -in. or  $10 \times 2\frac{1}{2}$ -in. filters that are generally standard. As the need for other sizes arises, the manufacturer will make the cartridges to meet any specifications.—**American Felt Co., Glenville, Conn.** 124B



### Wood-Chip Impregnator

**Reduces processing time for cellulosic materials.**

Where an hour or more was formerly required for the cooking or soaking of wood chips in certain processes, the new Impressafiner accomplishes impregnation in a matter of seconds. In addition to impregnation of wood chips with cooking liquors, the machine will also precisely add bleaches and other chemicals to sawdust, scrap lumber and similar materials.

In operation, a screw assembly gradually removes air and moisture by compression. When the feed material enters the impregnation chamber following the compression step, it suddenly expands in the presence of the liquid processing chemicals. As the material expands, the voids in the mass fill uniformly.

Daily capacity of the unit is rated at 50 to 75 tons.—**The Bauer Bros. Co., Springfield, Ohio.** 124C

### Teflon Bond Etchant

**Joins resin to itself and to other materials.**

Etchant for a new system for bonding Teflon resin to itself and to other materials is an activated form of sodium in solution. The compound has proved compatible with a variety of adhesives including epoxies, phenol formaldehydes, and most of the rubber and silicone varieties.

Tetro-etch, as it is known, reacts with the Teflon resin to form a carbonaceous film on the treated surface. This film then serves as a means of anchoring adhesives to the resin. Treat-

#### For More Information . . .

about any item in this department, circle its code number on the

#### Reader Service

postcard (p 247)



**Experience — the added alloy in Allegheny Stainless**



## What are your needs in Seamless Tubing?

A-L offers widest range of materials and large diameters with walls as thin as .032".

Here is the widest range in materials in stainless seamless tubing available anywhere to meet your exact requirements and solve high-temperature or corrosion problems and save you money.

Allegheny Ludlum makes seamless tubing in all stainless grades including 309, 317, 318, 310, 416 and 446—normally difficult to obtain. Also available in high-strength alloys such as A-286, in vacuum melted steels, and in custom analyses grades such as low cobalt with .01 or .05 max. and small boron additions to standard types.

A-L also makes composite tubes with bonded combinations of carbon and stainless and other metals for special chlorine-corrosion applications in process equipment.

Allegheny Ludlum Stainless Tubing ranges from  $\frac{3}{16}$ " OD to  $3\frac{1}{2}$ " OD with wall thickness ranging from .013" to .375"—typical of the sizes that A-L can produce. For certain applications, .500" walls are possible. Some standard sizes in stock are  $2\frac{1}{2}$ " OD—.032" walls, 3" OD—.042" walls and  $3\frac{1}{2}$ " OD—.042" walls and  $3\frac{1}{2}$ " OD—.058" walls. All sizes with true circularity, no dents or handling marks.

A-L Tubing is also available in small quantity orders, in random or cut lengths. Standard grades and sizes in stock throughout the country. Call your nearest A-L representative for all the help you need.

*Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa. Address Dept. CE-23.*

**NEW! FREE—Write for your copy of Allegheny Ludlum Stainless Tubing—32 pages of technical data, grades and suggested applications.**



WSW 7829



# ALLEGHENY LUDLUM

Export distribution: AIRCO INTERNATIONAL

**EVERY FORM OF STAINLESS . . . EVERY HELP IN USING IT**



ment time ranges from about 5 sec. to 1 min., depending upon application and conditions.

Bond peel strength with a typical epoxy adhesive runs from about 17 psi. on smooth Teflon to 35 psi. on corrugated ribbon. A 2-oz. bottle of etchant will treat between 1 and 3 sq. ft. of surface.—W. L. Gore & Associates, Newark, Del. 124D



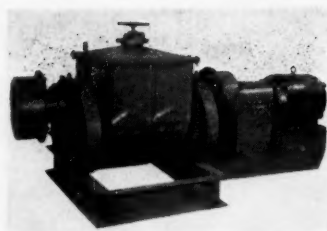
### Temperature Monitor

**Sounds alarm, activates light of off-normal point.**

A new instrument, known as the Simultaneous Temperature Alarm Readout, simultaneously monitors up to 100 temperature points, depending upon the number of 10-unit panels it contains. In operation, when any one of the points being sensed reaches the temperature set on the control dial, an alarm sounds and a numbered light flashes on the control panel.

Through constant contact, the unit eliminates time lag, a factor encountered with all scanning-type systems. Because each channel operates independently, the instrument will continue to sense the other 99 temperature points during any alarm. Overall accuracy is  $\pm 3$  deg. F.

Actual temperature of any point, normal or off-normal, is indicated by rotation of a set-point dial.—Fischer & Porter Co., Hatboro, Pa. 126A



### Vibrating Ball Mills

**German-made machines now offered in the U.S.**

Introduced in Germany immediately prior to World War II, a line of vibrating ball mills that pulverize, micronize and mix to critical standards is now being offered to North American industries. Feed materials can be either wet or dry.

Advantages claimed for the machine are ability to handle different types of raw and process materials, regardless of abrasiveness, hardness, toughness or compactness, plus higher output with reduced milling time. Operating cost is claimed to be very low. Capacity of six batch-loaded models ranges from 1 pt. to 55 gal.; four continuous models are available for use in conjunction with external classifiers.

In operation, high-velocity vibration forcibly agitates the milling media in a grinding chamber to reduce material being processed by crushing, shearing, grinding and attrition. Milling media and chamber liners adapt the mills to particular processing requirements.—Schutz-O'Neill Co., Minneapolis, Minn. 126B

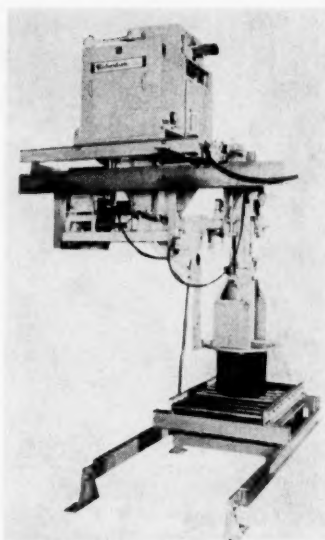
### Continuous Centrifugal

**Swiss unit can process wide range of materials.**

Under license agreement from Escher-Wyss Ltd. of Zurich, Switzerland, Baker Perkins is marketing a push-type, multi-stage centrifuge. The machine's ability to handle a wide range of products, including slower draining materials at high output, with no operator attendance and low power consumption, can reduce operating costs

by as much as 25% over present processing methods.

Design features of the compact machine provide easy accessibility to all working parts. It can handle particles down to 50-100 microns. Capacities range from a few hundred lb./hr. to 50 tons/hr.—Chemical Machinery Div., Baker Perkins, Inc., Saginaw, Mich. 126C



### Packing System

**Weights, fills drums or bags automatically.**

Automatic weighing and filling of drums or valve bags at rates to 600 lb./hr. of powdered product is the function of the new Richardson packing system. The system will handle fine powders with densities to 40 lb./cu. ft., or to 100 lb./cu. ft. for free-flowing materials.

In operation, a scale automatically weighs the material and delivers it to a receiving hopper over a Stoker packer. The product is deaerated, or compacted, at this point and conveyed by packer directly to

**EQUIPMENT  
NEWS**

Continues on . . . Page 232

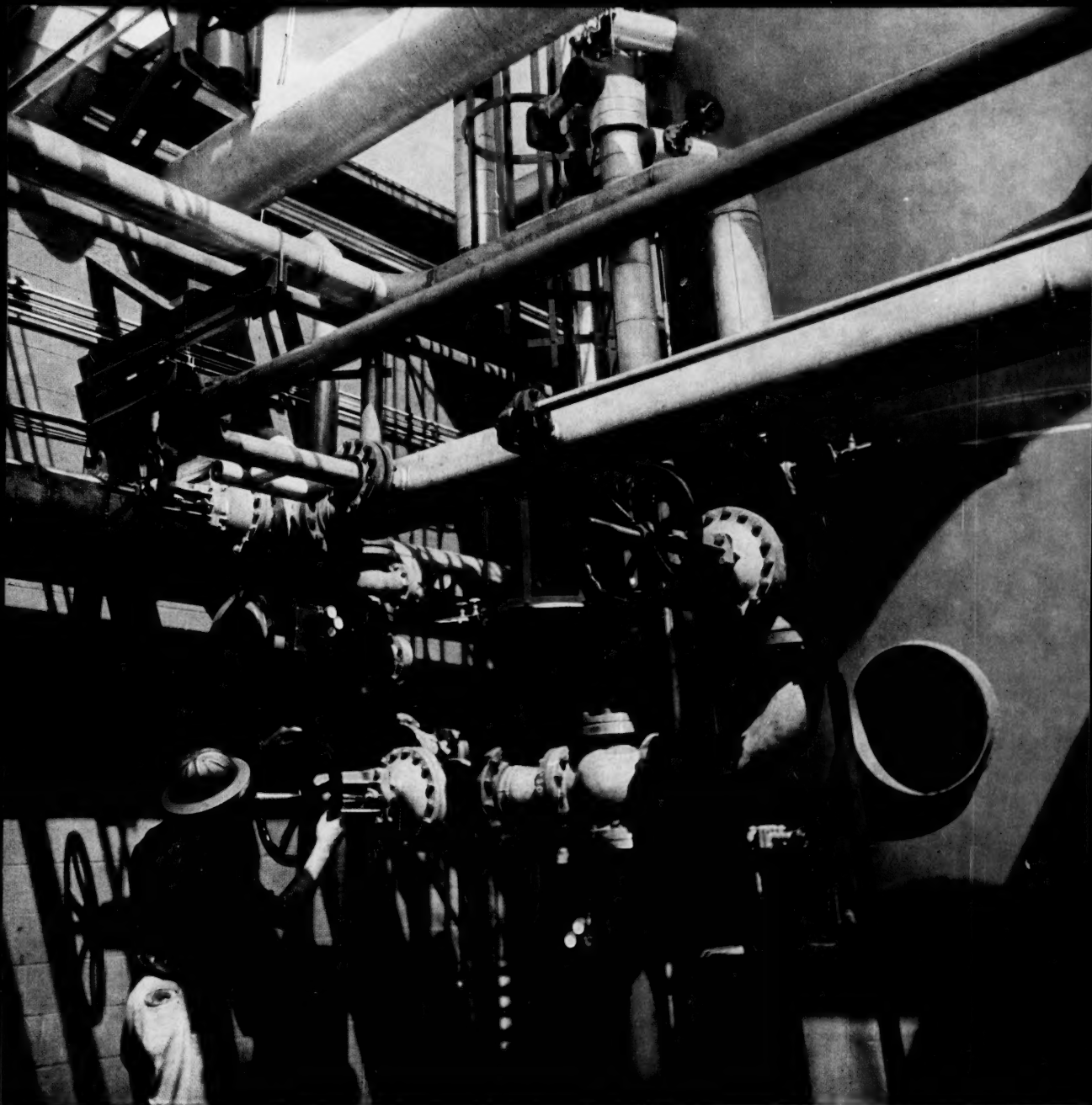


PHOTO ON ANSCOCHROME

**SPECIAL PROCESS**...General Aniline & Film Corporation's new plant at Linden, N. J., went on stream last year. Built by Scientific Design Co., Inc., it produces ethylene oxide by direct air oxidation of ethylene, Scientific Design's own efficient and economical process. The Aloyco Stainless Steel Valves here (red hand wheels) were selected for their design features and long life expectancy. On your next stainless steel valve job, why don't you talk first to the one company which specializes in high alloy valves exclusively. For further details about Aloyco Valves, write us at 1301 West Elizabeth Avenue, Linden, New Jersey. 95



## **ALLOY STEEL PRODUCTS COMPANY**

Boston • New York • Wilmington • Atlanta • Buffalo • Pittsburgh • Chicago • St. Louis • San Francisco • Los Angeles



# Get this at the Chem Show

Special Report:

## FILTRATION THROUGH REPLACEABLE CARTRIDGES

**BOOTH  
223**



COMMERCIAL FILTERS CORPORATION

This important new technical bulletin contains comprehensive data on the use of replaceable filter cartridges in the micro-clarification of liquid chemicals, petro-chemicals, pharmaceuticals, oils, liquid fuels, water, compressed air and other gases.

Get your personal copy at the Commercial Filters Corporation BOOTH (223), 27th Exposition of Chemical Industries, from November 30th through December 4th. Various types of cartridges and filters will be demonstrated.

*If you can't make the show, send for your free copy to Dep't CE*

**COMMERCIAL FILTERS CORPORATION**  
MELROSE, MASSACHUSETTS

# U.S.I. CHEMICAL NEWS

Nov.



A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries



1959

## Ralph Knight Appointed U.S.I. Vice President



Ralph M. Knight, Manager of Polyolefin Planning for U.S.I., was recently appointed a Vice President. In his new position, Mr. Knight will intensify U.S.I.'s long-range polyolefin development program. He will continue to direct

the Polymer Service Laboratory as well as to coordinate its efforts with other plastics activities within the company.

The newly created post is a reflection of the expanding role of polyolefin plastics in U.S.I.'s long-range growth plans. U.S.I. is currently the country's third largest producer of polyethylene, which it markets under the trade name PETROTHENE®. The company has underway an extensive expansion program which is expected to make it the second largest producer of polyethylene in the world by mid-1960.

Since joining the company in 1953, Mr. Knight has served as Polyethylene Manager, Polyethylene Production Manager, Assistant to the Vice President for Production, and Manager of Polyolefin Planning.

## Chlorine Data Sheet Now Available from U.S.I.

Properties, shipping information and uses for liquid chlorine are detailed in a new data sheet just issued by U.S.I. Complete references for property data are included.

The material, which U.S.I. ships in 30-ton and 55-ton tankcars from Huntsville, Alabama, is used primarily in the bleaching of

MORE

## Comprehensive Study Provides Data on Corrosion Resistance of Commercial Titanium-Base Alloys

### Alloys Generally Corrode More Than Commercially Pure Titanium

An intensive research program to determine the corrosion resistance of seven of the most commonly used titanium alloys has recently been completed. Results indicate that in strong acids such as sulfuric and hydrochloric, the alloys generally have less corrosion resistance than commercially pure titanium itself. One exception—an alloy containing about 3% aluminum and 2.5% vanadium—has about the same degree of corrosion resistance as the unalloyed metal.

### Methionine Indicated for Schizophrenia Treatment

Russian researchers have made a preliminary study which indicates that the sulfur amino acid, methionine, has a therapeutic effect in the treatment of schizophrenics. The treatment seems to give best results in the early stages of the illness.

The study was made with 20 patients, eight of whom had been ill for only a short time, with the disease in an acute form. The others had been afflicted for a long period. Methionine treatment was beneficial and helped normalize conditional and absolute reflex activity. In some cases the return of normal vascular reflexes preceded clinical improvements. Blood studies showed sharp changes in the index of thymol reaction and glutamine content of the serum after methionine treatment. The researchers analyzed the urine of the patients and confirmed improved nitrogen metabolism when methionine was administered.

It was noticed that patients become more communicative after treatment. Their appetite and sleep improved, along with their ability to take care of themselves. Psychopathological symptoms leveled off.

All seven alloys are reported to be completely resistant to solutions of ferric chloride, sodium chloride and sodium hydroxide and, with very few exceptions, to formic acid—under test conditions. Test results in aluminum chloride solutions were very erratic. However, they do indicate that under some conditions, these solutions can attack both titanium and its alloys very severely. In oxalic acid, all alloys corrode excessively.

The program revealed that polished surfaces are more corrosion resistant than pickled-finish surfaces, and that a high dissolved oxygen content in acid solutions slows corrosive action on both the metal and its alloys. The alloys tested, and their chemical analyses, are shown in table 2.

They were immersed for 336 hours in the following corrosants at 95°F. and/or 190°F.: 1, 3 and 5% hydrochloric acid, 5% sulfuric acid, 5% oxalic acid, 25% formic acid, 25% aluminum chloride, 25% ferric chloride, saturated sodium chloride and 25% sodium hydroxide. Studies were made without agitation of the corrosive solution, with air agita-

MORE

TABLE 1.

## CORROSION RATES, mpy

ALLOY	190°F										95°F									
	NO AGITATION					AIR AGITATION					N <sub>2</sub> AGITATION									
	1% HCl	3% HCl	5% H <sub>2</sub> SO <sub>4</sub>	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H <sub>2</sub> SO <sub>4</sub>	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H <sub>2</sub> SO <sub>4</sub>	5% Oxalic	25% Formic **	3% HCl	5% HCl	5% H <sub>2</sub> SO <sub>4</sub>	5% Oxalic	25% Formic **
Comm. Pure Ti—75 BHN	0.10	142	452	—	E	0.07	*	55.6	—	E	4.9	16.1	16.4	—	E					
Comm. Pure Ti—120 BHN	3.3	140	254	1158	E	0.17	*	*	38.4	E	5.2	8.2	20.0	52.0	E					
Comm. Pure Ti—180 BHN	0.17	196	571	705	E	0.03	*	9.96	20.7	E	5.1	10.4	17.5	32.7	E					
Comm. Pure Ti—200 BHN	0.10	216	560	801	E	0.07	*	8.4	14.0	E	6.4	11.1	31.1	32.7	E					
MST 821, Annealed	0.29	233	877	588	E	0.13	28.6	17.0	47.9	E	9.24	17.9	41.9	82.7	5					
MST 6 Al—4V, Annealed	59.5	357	872	1582	164	1.35	31.8	44.8	41.9	E	12.4	18.7	32.4	42.8	5					
MST 6 Al—4V, Age Hardened	49.4	378	850	983	164	4.05	26.6	26.9	25.7	E	7.97	16.2	29.8	61.9	5					
MST 5 Al—2.5 Sn, Annealed	83.2	588	1230	1877	E	13.7	36.6	43.7	57.1	E	22.8	38.5	52.9	43.4	E					
MST 821, Annealed	1.46	313	646	1418	E	0.46	14.7	37.2	54.4	E	9.85	16.6	23.7	62.2	E					
MST 2.5 Al—16V, Solution Treated	3.4	160	591	561	50	0.49	5.2	0.65	23.8	E	5.47	9.8	21.4	20.2	E					
MST 2.5 Al—16V, Age Hardened	3.7	211	660	988	50	0.23	14.2	24.0	22.6	E	9.11	17.6	38.0	20.6	E					
MST 185, Annealed	37	430	888	582	E	0.06	*	*	21.8	E	12.9	19.8	43.5	19.0	E					
MST 185, Age Hardened	74	450	946	1039	E	0.33	*	*	33.5	E	14.6	22.3	45.5	40.3	E					
MST 3 Al—2.5V, Annealed	0.30	147	667	1028	E	0.10	0.05	*	23.1	E	5.01	7.43	16.4	24.8	E					

\* results erratic

\*\* no tabular data except as shown.

E indicates complete resistance.



Nov.

★

# U.S.I. CHEMICAL NEWS

★

1959

## CONTINUED

### Chlorine

pulp and paper, in the manufacture of chlorinated solvents, in making plastics, resins, automotive fluids, insecticides, herbicides, refrigerants, propellants, and in water and sewage treatment.

The data sheet can be obtained from U.S.I. sales offices or from the Chlorine and Caustic Soda Sales Department, 99 Park Avenue, New York.

### Have you a new product to tell the world about?

Make it routine to send your publicity releases to the Editor, U.S.I. Chemical News, often called the "Front Page of the Chemical Process Industries."

## CONTINUED

### Titanium Alloys

tion and with nitrogen agitation.

Actual corrosion rates in mils per year (mpy) are shown in table 1. The following ratings permit interpretation of these mil-per-year figures:

Corrosion rate, mpy	Rating
less than 0.5	Excellent
0.5 to 5.0	Good
5.0 to 10.0	Fair
more than 10.0	Poor

The alloys rated about as follows in the tests, starting with the most highly corrosion resistant:

- (1) MST 3A1-2.5V
- (2) MST 2.5A1-16V
- (3) MST 8A1-2Cb-1Ta (821)
- (4) MST 1A1-8V-5Fe (185),  
MST 8 Mn, MST 6A1-4V
- (5) MST 5A1-2.5Sn

TABLE 2: CHEMICAL ANALYSES OF TITANIUM ALLOYS USED IN CORROSION TESTS

ALLOY	% O <sub>2</sub>	% N <sub>2</sub>	% C	% H <sub>2</sub>	% Fe	% Al	% V	% Mn	% Cb	% Ta	% Sn
MST 8Mn	0.097	0.01	0.04	0.0082	0.13	..	..	8.2	..	..	..
MST 6A1-4V	0.059	0.011	0.04	0.0031	0.20	6.27	4.21	..	..	..	..
MST 5A1-2.5Sn	0.142	0.02	0.02	0.0032	0.19	5.00	..	..	..	..	1.99
MST 821	0.101	0.015	0.02	0.0062	0.25	7.96	..	..	2.25	1.01	..
MST 2.5A1-16V	0.093	0.015	0.04	0.0130	0.20	2.85	15.94	..	..	..	..
MST 185	..	0.004	0.02	0.0084	5.09	1.76	7.28	..	..	..	..
MST 3A1-2.5V	0.120	0.011	0.06	0.0020	0.17	2.91	2.45	..	..	..	..

## New Synthetic Ketone With Fresh, Leafy Odor Gives Soap Perfumer New Tool

A new synthetic aromatic ketone, related in activity to a group of trace constituents of essential oils, has recently been discovered and found to possess the soap-scenting effectiveness usually associated with natural materials. Thus the new synthetic material is reported to give the perfumer a new tool for achieving lasting, strong, stable and fragrant soap perfumes with increasing independence from the essential oils.

Although the characteristic, fresh, leafy note of the ketone is not new—an almost identical note being found in petitgrain oil—the new ketone is said to offer many possibilities for original perfumes not possible with petitgrain oil itself. This because it is a concentrated note free from terpene and other ester components that would hamper its adaptability. The material is offered for use by the soap perfumer in petitgrain, bergamot, lavender, vetiver, lemon, neroli and geranium type compositions.

Tests were performed with the new ketone in soap bars and powders, and liquid and powdered detergents. In all cases, the material was reported to give a strong fragrance which lasted, unchanged as to strength and character, through accelerated aging tests.

When incorporated into soap bouquets, the ketone is reported to contribute these advantages to soap cake fragrance: cakes retained their fresh note long after identical cakes without the ketone became flat and lifeless; cakes gave a more diffusive fragrance than identical cakes without the ketone; cakes containing the ketone were judged to have a more refreshing and exhilarating scent.

## TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

**Glycerine** properties, reactions, performance are covered in new 20-page booklet now available. Describes all commercial grades and types; includes information on storage, shipping, handling; covers variety of known uses. **No. 1530**

**Pilot scale versions of two commercial continuous centrifuges** can now be obtained for clarifying, separating and concentrating in lab and pilot plant. One unit is for liquids with up to 20% solids, the other for up to 5% solids. **No. 1531**

**Montmorillonite catalysts**, made from bentonite and aluminum hydrosilicate and used mainly in reactions otherwise catalyzed with hydrogen acids, are now marketed in U.S. Characterized by highly selective catalytic activity. **No. 1532**

**New type applicator for ether aerosol diesel starting fluid** has been developed. Holds standard aerosol can and feeds fluid into intake manifold of engine through closed system. Said to give quick start without fluid waste or vapor escape. Is compact, fits any engine. **No. 1533**

**New guide for fire and explosion prevention** in plants producing and handling zirconium can now be purchased. Pamphlet outlines safeguards for fire prevention, dust collection, fire protection, and disposal of waste materials. **No. 1534**

**Skin lotion** to keep hands free from drying by solvents has been developed for use by chemists and clinicians working with acetone, methanol, ether, alcohol, xylene, benzene, chloroform, detergents, alkalis, etc. **No. 1535**

**New facepiece for gas and hose masks**, air line respirators, demand breathing apparatus, is now on market. Features easily replaceable, large single lens, improved speaking diaphragm, built-in accommodation for glasses, no fogging. **No. 1536**

**Acid inhibitor has been made odorless**, without changing inhibiting properties of product. Material is added in small amounts to acid pickling solutions to prevent attack of steel and copper, and reduce rust during steel drying. **No. 1537**

**Laboratory production and use of sodium wire** are in new technical data sheet. Includes photo, diagrams, complete description of equipment; extrusion method; typical reaction of the wire in Bouveault-Blanc reduction. **No. 1538**

**New Product for poison ivy treatment** is said to act quickly by neutralizing ivy phenols which cause rash and itch. Works on ion exchange principle to convert toxic phenolic compounds to inactive phenolates. **No. 1539**

## PRODUCTS OF U.S.I.

**Alcohols:** Ethyl (pure and all denatured formulas); Anhydrous and Regular Proprietary Denatured Alcohol Solvents SOLOX®, FILMEX®, ANSOL®M, ANSOL® P.

**Organic Solvents and Intermediates:** Normal Butyl Alcohol, Amyl Alcohol, Fusel Oil, Ethyl Acetate, Normal Butyl Acetate, Diethyl Carbonate, DIATOL®, Diethyl Oxalate, Ethyl Ether, Acetone, Acetoacetanilide, Acetoacet-Ortho-Chloranilide, Acetoacet-Ortho-Toluidide, Ethyl Acetoacetate, Ethyl Benzoylacetate, Ethyl Chloroformate, Ethylene, Ethyl Sodium Oxalacetate, Sodium Ethylate, Urethan U.S.P. (Ethyl Carbamate), Riboflavin U.S.P.

**Pharmaceutical Products:** DL-Methionine, N-Acetyl-DL-Methionine, Urethan USP, Intermediates.

**Heavy Chemicals:** Anhydrous Ammonia, Ammonium Nitrate, Nitric Acid, Nitrogen Fertilizer Solutions, Phosphatic Fertilizer Solution, Sulfuric Acid, Caustic Soda, Chlorine, Metallic Sodium, Sodium Peroxide.

**PETROTHENE® ... Polyethylene Resins**

**Animal Feed Products:** DL-Methionine, MOREA® Premix (to authorized mixer-distributors).



**U.S.I. INDUSTRIAL CHEMICALS CO.**  
Division of National Distillers and Chemical Corporation  
99 Park Avenue, New York 16, N. Y.

### U.S.I. SALES OFFICES

Atlanta • Baltimore • Boston • Chicago • Cincinnati • Cleveland  
Detroit • Kansas City, Mo. • Los Angeles • Louisville • Minneapolis  
New Orleans • New York • Philadelphia • St. Louis • San Francisco



## SEE HOW ARMCO SPECIAL STEELS ARE USED TO IMPROVE EQUIPMENT PERFORMANCE AND CUT MAINTENANCE

New steels are  
born at  
Armco



Armco exhibit at the Exposition of the Chemical Industries, November 30 to December 4, will feature applications of special-purpose steels in processing equipment. Visit Booths 1221-23-25.

Designed for idea-seeking engineers and executives, Armco's exhibit at the 27th Annual Exposition of the Chemical Industries will show how Armco corrosion-resistant steels are used to improve the performance of equipment and help solve the problem of high maintenance costs.

Besides seeing specific examples of the use of Armco ALUMINIZED STEEL Type 2, Armco Precipitation-Hardening Stainless Steels and Armco ELC Stainless Steels, visitors will also have an opportunity to confer with Armco metallurgists and engineers on the properties of these metals and their logical areas of application in processing units.

Visit Booths 1221-1225 and see how your colleagues in the industry have utilized the properties of Armco Special Steels to solve troublesome problems involving wear, abrasion, high temperature and corrosion.

If you don't plan to attend the Exposition, let us send you useful information on any or all of these performance-improving, cost-cutting Armco Steels. Just fill out and mail the coupon.

**ARMCO STEEL CORPORATION**  
3429 Curtis Street, Middletown, Ohio

Send me information on:

- ☐ Armco ALUMINIZED STEEL Type 2
- ☐ Armco Precipitation-Hardening Stainless Steels
- ☐ Armco ELC Stainless Steels

Name

Company

Street

City  Zone  State

## ARMCO STEEL



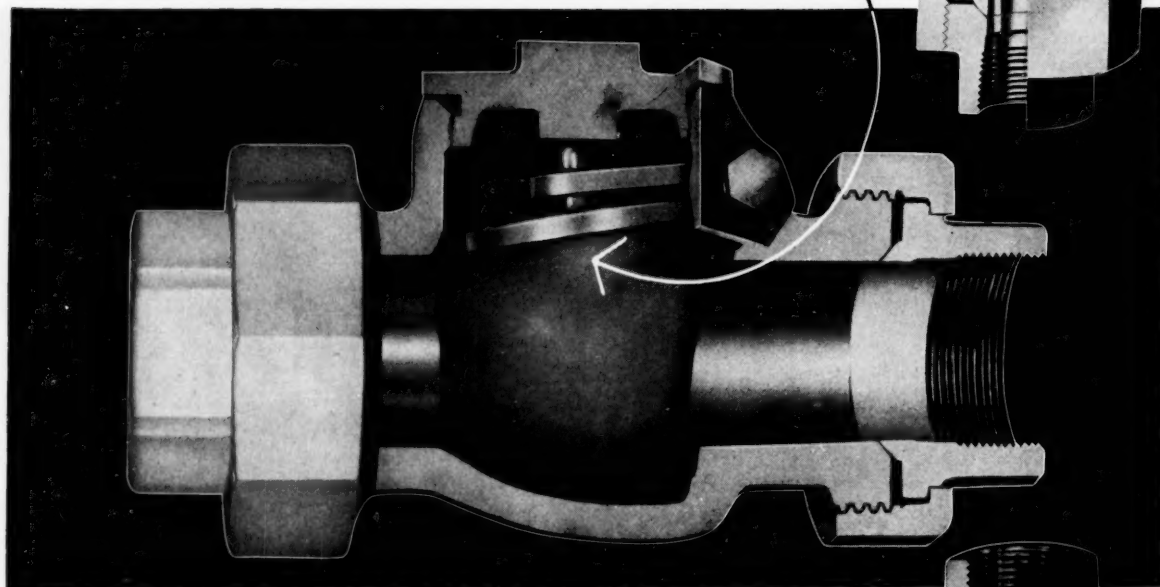
Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation

# Brand New!

## CLAYTON MARK

### *full opening*

# UNION CHECK VALVE



## ALLOWS FREE PASSAGE OF PRODUCT SEPARATING OR LINE CLEANING DEVICES!

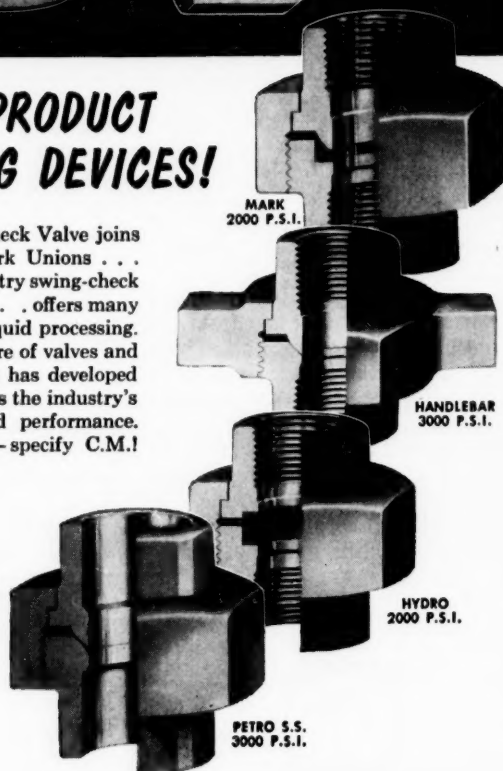
- Full Opening Poppet
- Removable Stem
- Metal to Metal Seats
- Fits 2" Diameter Pipe
- Rated 500 P.S.I.—W.O.G.

New *full opening* Union Check Valve joins the family of Clayton Mark Unions . . . bringing to industry a top entry swing-check valve with superior features . . . offers many advantages especially for liquid processing. A pioneer in the manufacture of valves and steel unions, Clayton Mark has developed a complete line that serves as the industry's "yardstick" of quality and performance. When you want the best—specify C.M.!

*Feature for feature CM Unions are superior!*

## CLAYTON MARK & COMPANY

1900 Dempster Street • Evanston, Illinois



## Which of these 3 products and services can you



### What's new in Metal Treatments and Etching?

Quite a few things. For example, there's the use of Becco Ammonium Persulfate in etching printed circuits. Seems the material works a lot better—at less cost—and with none of the hazards of the ferric chloride solutions conventionally used.

Then, there's the problem of pickling copper and brass. Lots of pickling agents will do this—only trouble is, you've got to paint or plate or do whatever you're going to do with the metal rather quickly. Or else. Or else it will tarnish or oxidize and you're in the pickle all over again.

Not so with Ammonium Persulfate. Cleans fine. Puts a mild etch on the surface, too, for better paint or plating bonding. More important, perhaps, is the fact that the metal resists retarnishing for up to two weeks. Ideas?

We hope so. What's more, we've got several booklets to help spur you on. They're free—use the coupon below to order.

**No. 39 and 51—Surface Treatment of Metals with Peroxygen Compounds.**

**No. 86—Improving Properties of Copper and Brass Surfaces.**

**No. 97—Paddle Etching of Printed Circuits with Ammonium Persulfate.**

**No. 99—Tank Immersion Etching of Printed Circuits with Ammonium Persulfate.**

**No. 102—Etching of Printed Circuits with Mercury Activated Persulfate.**



### What's a PEROXYGEN?

Fact is, "peroxygen" is a word that Becco uses to indicate that we can tie oxygen onto just about anything.

How come? Well, years of experience in producing Hydrogen Peroxide has produced an affinity between Becco and oxygen—an affinity we have capitalized on to give you compounds that will provide a ready source of oxygen—wherever, however and whenever you need it.

We have a good number of such compounds on the shelves. Quite a few others are in development. Still others are merely in our minds, but we can begin drawing them out if you're interested.

We hope you are interested. But we'll never know—unless you fill in the coupon below and mail it to us. Why not?

## Problems in handling Hydrogen Peroxide



Becco's Four-Fold Engineering Service Program—offered free—includes:

1. Comprehensive survey of your facilities.
2. Specific proposal with recommendation of proved equipment and where it is obtainable.
3. Installation supervision by Becco.
4. Periodic inspection and permanent service.

Can you use this free Becco help, based on more years of experience with bulk handling of  $H_2O_2$  than any other manufacturer? Use the coupon to let us know.

# BECCO



BECCO CHEMICAL DIVISION, FMC  
Station B, Buffalo, New York

Dept. CE-E

Gentlemen:  
Please send me the following free bulletins:

- ☐ 39 and 51 ☐ 86  
☐ 97 ☐ 102 ☐ 99

NAME \_\_\_\_\_

FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

ZONE \_\_\_\_\_ STATE \_\_\_\_\_

# BECCO



BECCO CHEMICAL DIVISION, FMC  
Station B, Buffalo, New York

Dept. CE-D

Gentlemen:  
Send me more information about Becco Peroxygen Chemicals.

NAME \_\_\_\_\_

FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

ZONE \_\_\_\_\_ STATE \_\_\_\_\_

# BECCO



BECCO CHEMICAL DIVISION, FMC  
Station B, Buffalo, New York

Dept. CE-B

Gentlemen:  
Please tell me more about your Four-Fold Engineering Service.

NAME \_\_\_\_\_

FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

ZONE \_\_\_\_\_ STATE \_\_\_\_\_

# New!

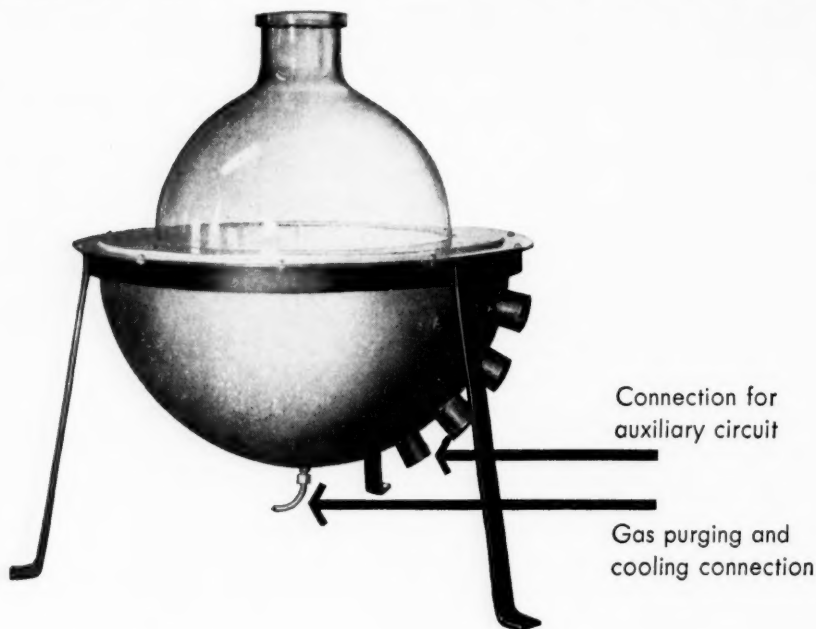
Here's the ultimate in safety and control for distillation and fractionation processes . . .

...the series U

## Glas-Col Heating Mantle

... with small auxiliary circuit to supply vaporization heat for high-boiling residues\*

... with special connections for gas purging and cooling\*\*



**AUXILIARY CIRCUIT:** Each Glas-Col Series U Heating Mantle includes a small auxiliary circuit at the bottom, center.

When a small amount of high-boiling residue remains in the flask, this circuit can be used to furnish the heat of vaporization . . . while the upper circuits are turned off or operated at reduced heat input. This prevents superheating of the bare wall of the flask above the liquid level, and thus eliminates damage to flask, damage to heat-sensitive chemicals, and superheating of vapors before they reach the column.

At the beginning of a fractionation, when the flask is full of liquid, the upper circuits can be adjusted so input is just INSUFFICIENT to maintain the desired rate of flux.

THEN the small auxiliary circuit can be cut in and out to obtain the desired reflux rate.

**GAS PURGING AND COOLING CONNECTION:** Fire hazards are eliminated because heating elements can be continuously blanketed by a slow stream of inert gas such as nitrogen, which is bled in through a special connection.

And cooling can also be accomplished by passing air into the special connection and through the mantle housing.

Sizes and Prices: Glas-Col Series U Mantles are available for flask sizes ranging from 1 liter through 22 liters. Made with quartz fabrics, Series U Mantles are designed to operate at temperatures to 650°C. Prices range from \$34<sup>00</sup> to \$144<sup>00</sup>.

*Safety and control to the last drop!*

**GLAS-COL**

**Electric Heating Mantles**

\*U. S. Patent No. 2,739,220

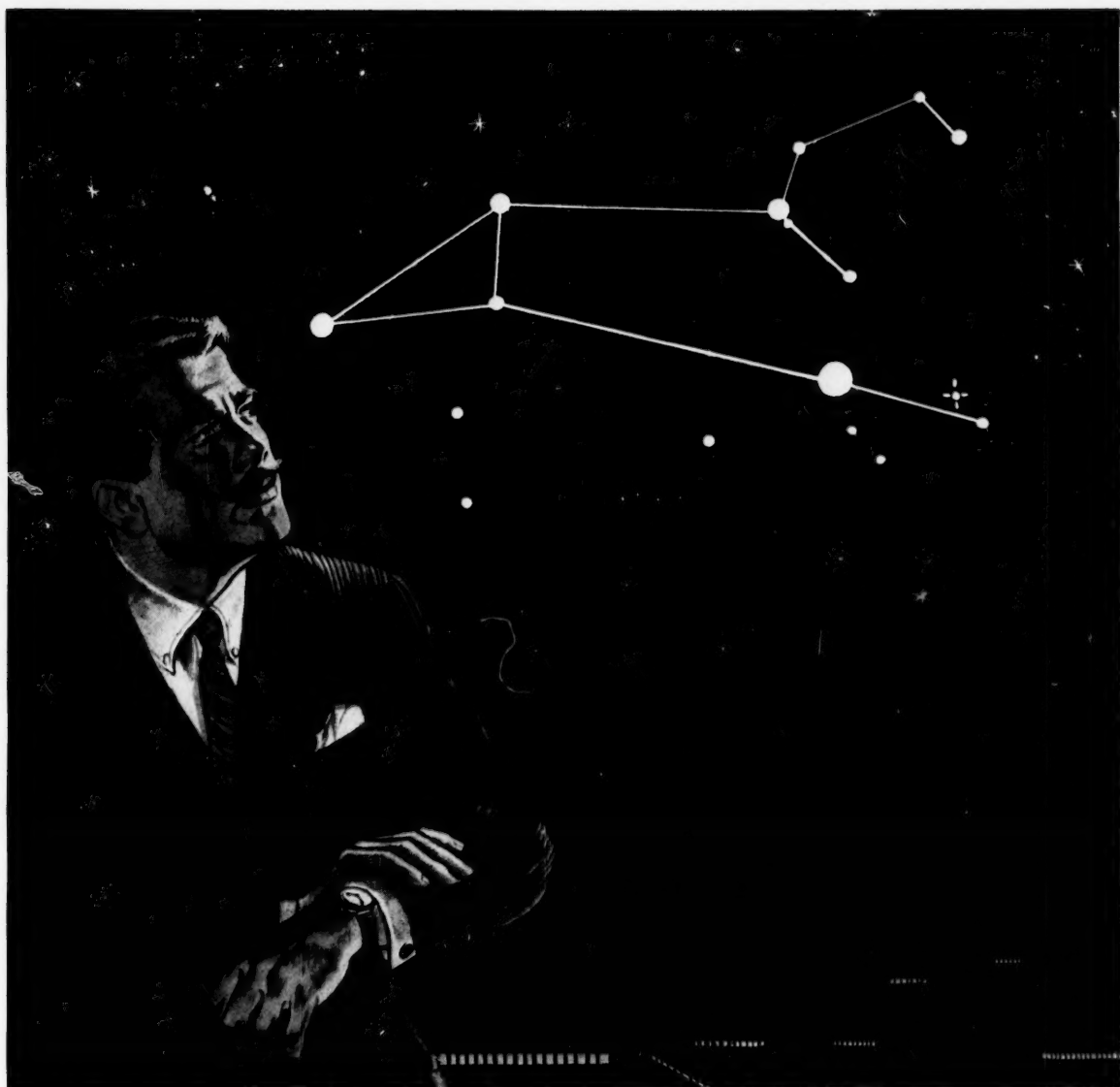


\*\*U. S. Patent No. 2,739,221

Glas-Col Apparatus Co., Inc.  
Dept. CR  
711 Hulman Street  
Terre Haute, Indiana

**New Bulletin! For more detailed information, ask for Bulletin 4-D**





## RELIABILITY...

Because the movement of the stars never varies, an astronomer can determine time to the exact second by checking the position of Leo, Orion, or one of the other constellations that appear in the night skies. That's *reliability* — a word that has become a motto for Mikro-Products. Serving the rapidly growing processing industries, our reputation rides on the performance of the

equipment we manufacture . . . good reason why our standards are high . . . good reason why Mikro grinding, conveying and dust collection units are built to put greater efficiency and economy into our customers' operations. If you'd like to know more about Mikro-Products . . . about Mikro quality and reliability, the information is yours on request, and without obligation.

## MIKRO-Products

Pulverizing Machinery Division • Metals Disintegrating Company, Inc.  
55 Chatham Road • Summit, New Jersey



### PROCESSING SYSTEMS



GRINDING CONVEYING COLLECTING

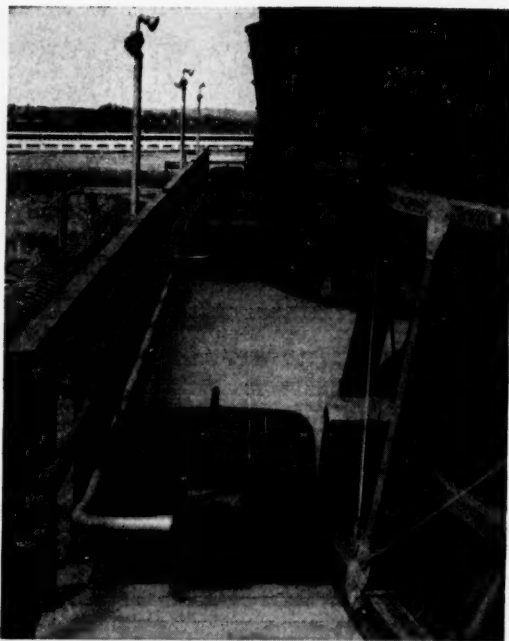
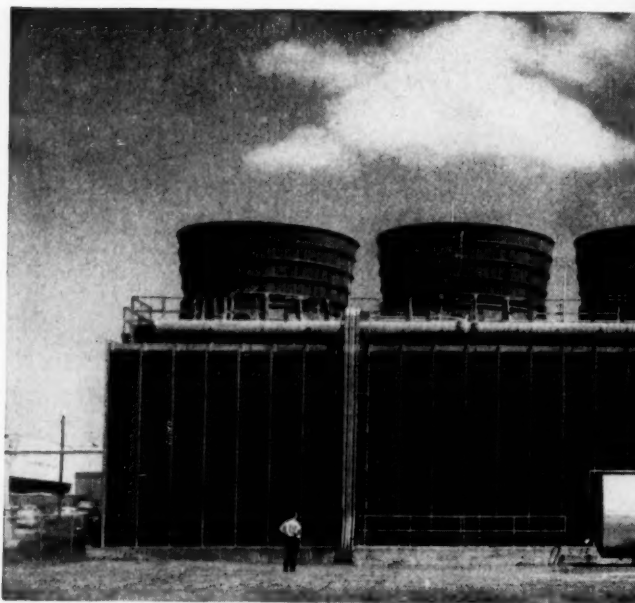
REPRESENTATIVES throughout the United States, Continental Europe, British Isles, Canada, Mexico, Central and South America, West Indies, South Africa, India, Japan, Philippines, Australia and New Zealand.

MANUFACTURING FACILITIES: United States, Canada, Continental Europe, British Isles.



ELECTRIC MOTORS ... THE CHOICE  
OF LEADERS IN INDUSTRY

## ***Tower for Power*** **COOLS 28,000** **GALLONS OF** **WATER PER MINUTE**



75 hp Wagner Type EP Motors drive the four 22-foot fans in this St. Joseph Light and Power Company's cooling tower.

**T**his Marley Double-Flow 4-cell cooling tower, at St. Joseph Light and Power Company, cools water at the rate of 28,000 gallons per minute to get more kilowatts from steam.

Driving 22-foot cooling tower fans is a job for rugged motors—motors that must operate without attention month after month, completely exposed to all kinds of weather and to constant high humidity, the number one cause of motor failure in cooling tower applications.

The Wagner Type EP Motors used on this tower meet

these requirements. All vital parts are totally-enclosed for extra protection against fumes, dust and moisture ... and the frames, endplates and conduit box are made of heavy cast iron for extra protection against high humidity and corrosion.

These versatile standard motors can meet your requirements for motor drives that must operate under adverse conditions. They are available in ratings through 500 hp. Call your nearby Wagner field engineer, or write for Bulletin MU-224 (Covers standard and explosion-proof totally-enclosed fan-cooled motors).

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

### **Wagner Electric Corporation**

6407 PLYMOUTH AVENUE, ST. LOUIS 14, MISSOURI

WM59-5

SERVING 2 GREAT GROWTH INDUSTRIES... ELECTRICAL... AUTOMOTIVE



# "How Jessop Stretches Specialty Steels"

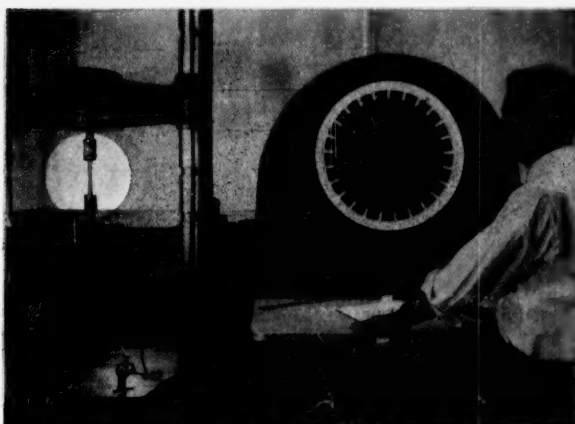
Robert Timko, Metallurgist

"At Jessop, tensile testing of specialty steels is carried out with far more than ordinary precision. It pays. It's one of the reasons our repeat business is so high.

"Based on a series of photographs, this drawing shows a specimen of type 304 annealed stainless steel bar at the climax of a tensile strength test. Moving apart, the heads of the tensile testing machine stretched the bar until it finally ruptured at 5500 psi above the spec."

In this Jessop metallurgical laboratory, top metallurgists using all types of modern testing equipment help us make certain you get *consistent* high quality in specialty steels. *Specify Jessop . . . and then relax.*

VMA 6788



Tensile testing machine in the Jessop metallurgical lab. Stretch, strain and then bang! The specimen of type 304 annealed stainless bar ruptured at 5500 psi above the spec. Tensile strength okay!

In the Jessop metallurgical lab, this tensile testing machine is one of many types of tools used to make certain you get *exactly* what you want in specialty steels.

Jessop Steel International Corporation    Green River Steel Corporation  
Steel Warehousing Corporation, Chicago    Jessop Steel of Canada, Ltd.

**JESSOP**  
STEEL COMPANY  
Washington, Pennsylvania

Stainless, alloy, cast-to-shape, clad and forging steels, ground flat stock and other specialty steels

# SEE



**THE  
SPARKLER  
AUTOMATIC·SELF CLEANING  
FILTER**

**At the 27th Exposition of Chemical Industries  
New York • Nov. 30–Dec. 4**

# BOOTH-56



**SPARKLER MANUFACTURING CO.  
MUNDELEIN, ILLINOIS U. S. A.**

Sparkler International Ltd., Manufacturing Plants at Leliegracht 9,  
Amsterdam, Holland; Toronto, Ontario, Canada; Italy and Australia.

**FILTRATION ENGINEERING AND MANUFACTURING EXCLUSIVELY FOR OVER 35 YEARS.**



# LINDE packaged oxygen plant sets nine-year record for availability!

THE LINDE oxygen plant shown here has been serving a leading chemicals producer "over-the-fence" continuously since 1949. Its operating log shows a 98%+ availability factor. This year, capacity has gone up from 360 to 800 tons of oxygen a day.

You can expect the same continuity of supply with a LINDE packaged plant serving your process. Your LINDE plant will be the product of fifty years' experience in the design, manufacture, and operation of air separation plants and low temperature equipment. LINDE is uniquely qualified to provide air separation plants for the supply of oxygen and/or nitrogen as well as the associated low temperature equipment for:

- liquefying hydrogen, helium and fluorine
- purifying hydrogen and helium
- separating hydrogen from coke oven gas
- ammonia and methanol synthesis
- upgrading of natural gas
- other extremely low temperature processes.

Put LINDE's more than 50 years' experience in gas separation techniques to work for you. Write Dept. CE-113 LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. In Canada: Linde Company, Division of Union Carbide Canada Limited.

"Linde" and "Union Carbide" are trade-marks of Union Carbide Corporation.



*Linde*  
TRADE-MARK

Industries that regularly require large quantities of oxygen or other atmospheric gases can obtain those they need from a LINDE plant on their own sites. The oxygen plant illustrated—built, owned, and operated by LINDE—is at a plant of one of the nation's largest chemical processors.

**UNION  
CARBIDE**

**REDUCE  
COSTS**

DRY  
POWDERS

KAOLIN  
CLAY

PHOSPHATE

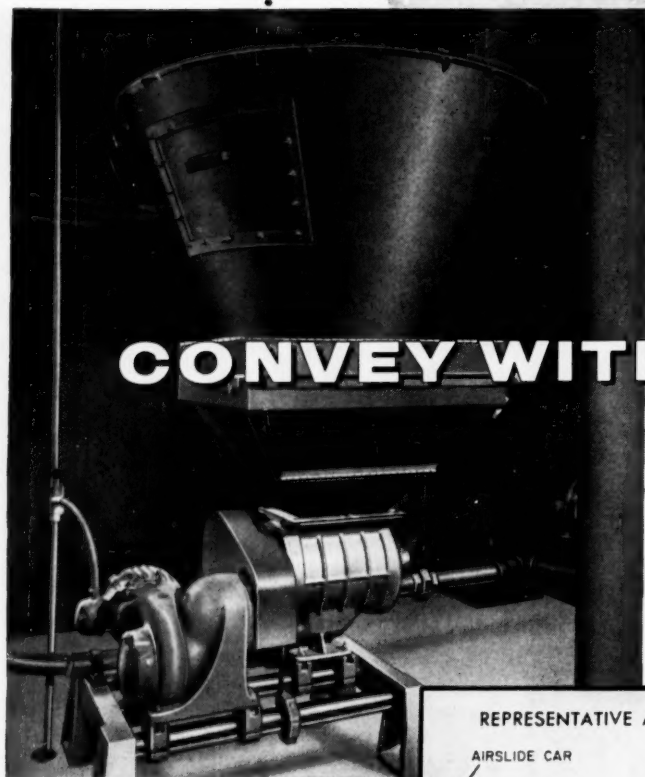
POLYETHYLENE  
PELLETS

CHEMICALS

**CONVEY WITH AIR**

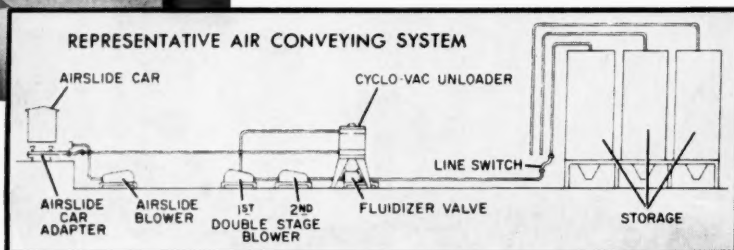
**BENEFITS:**

- Significantly lower handling costs for any powdered or granular material. Average savings: \$3.60 to \$6.10 per ton.
- Buy in bulk—eliminate cost of individual containers
- Free valuable space and working capital
- Completely sanitary system



*Most Advanced in  
Modern Air Handling*

**Fluidizer**



**THE FLUIDIZER COMPANY, A DIVISION OF SUPERIOR SEPARATOR CO.**

121 Washington Avenue South, Hopkins, Minnesota • WESt 8-7651

**OFFICE:**

Chicago—  
C. W. Smith—Sy 9-5172

**REPRESENTATIVES:**

• Akron—M. Monchlovich Co.  
• Baltimore—Robert Case  
• Buffalo—Danforth & Cunningham (Orchard Park)  
• Houston—H. B. McDill  
• Los Angeles—Lester Scott (Pasadena)

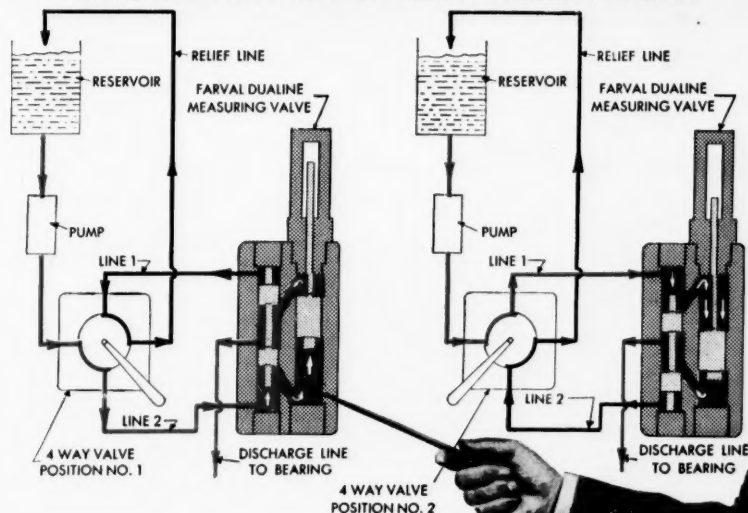
Louisville—Systems Engineering Co. (Jeffersonville)  
Omaha—Wm. Freiden  
Philadelphia—Joos Equipment Co. (Bryn Mawr)  
Pittsburgh—Control Equipment Dist.  
Roanoke—W. R. Mayes Co.

St. Louis—Tri-State Metal Products  
Seattle—The Temco Co.  
Spokane—Carter Miller Mill Furn. Co.  
Ft. Wm., Ont.—Northland Mach. Sup. Co.  
Montreal—W. G. Hewlings Co.

FARVAL  
—Studies in  
Centralized  
Lubrication  
No. 246

*"For positive lubrication of large,  
medium and heavy-duty installations  
... it's a Farval Dualine System!"*

FARVAL DUALINE SYSTEMS USE SIMPLE HYDRAULIC PRINCIPLES



*With Farval Dualine centralized lubricating systems you get  
the following distinct advantages over other type systems . . .*



(a) Much lower operating pressures with consequently less danger of soap separation on grease systems. Also, less danger of system damage due to high lubricant pressures.

(b) Large lubricant passages with no pinhole ports, ensures practically full pump pressure for every metering valve. This is one of the reasons why Farval Dualine systems operate on lower pressures — give less sieving and working of lubricants.

(c) Positive indication at each bearing — does not have to depend on the questionable action of a single indicator at the pump.

(d) Each metering valve individually adjustable for the requirements of the bearing it serves.

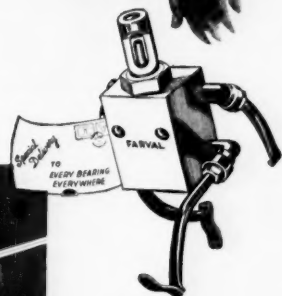
(e) Independent metering valve operation. Should trouble develop with one valve, the system will continue to operate. Only one bearing (not all the bearings) will require hand lubrication until trouble is corrected.

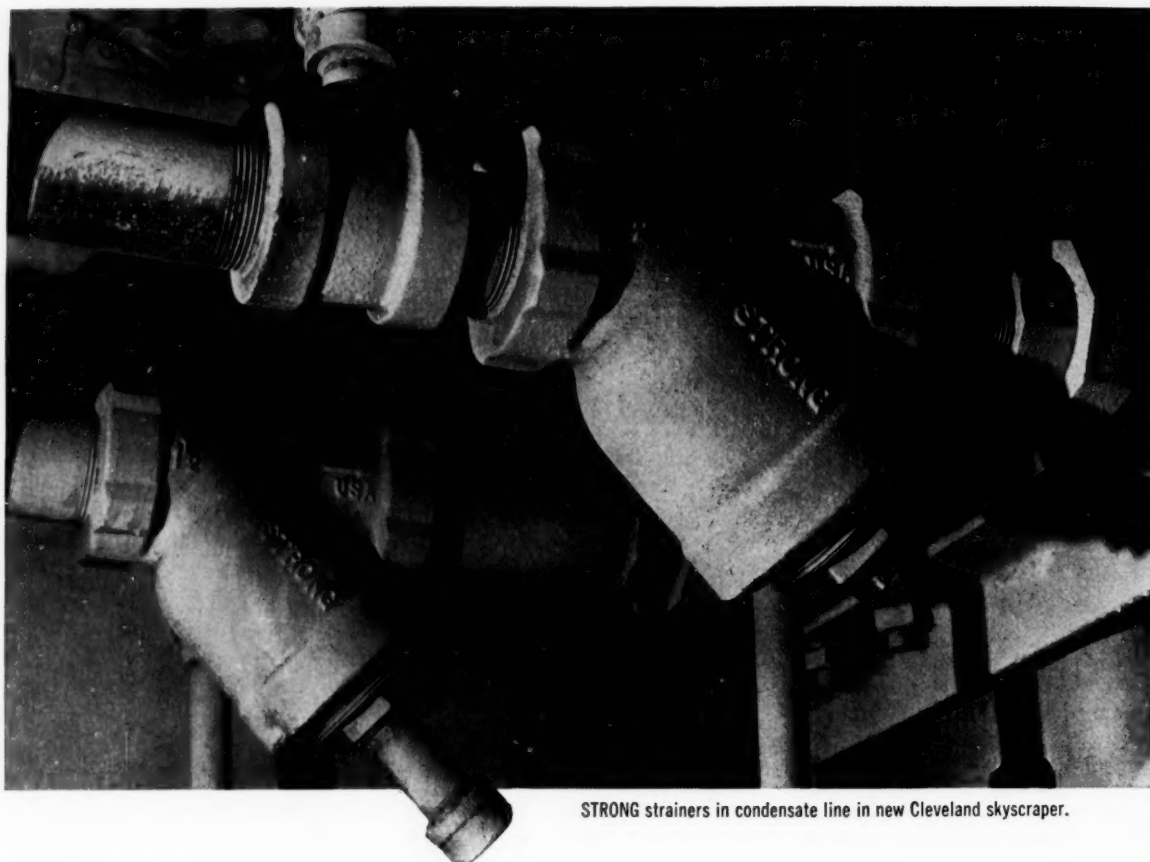
(f) True lubricant metering. Quantity of lubricant delivered to one bearing is not dependent on any other valve in the system.

(g) Much easier to spot and correct trouble.

Check with your Farval Representative and see how these versatile systems can improve production operations — reduce costs. Or write for free Bulletin 26-T containing complete engineering information on Farval Dualine systems. The Farval Corporation, 3275 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company  
A subsidiary of Eaton Manufacturing Company





STRONG strainers in condensate line in new Cleveland skyscraper.

**select the**  
**STRONG®**  
**strainer**  
**designed**  
**for**  
**you!**

IN steam, air, gas, water, oil or chemical systems, a *correctly selected* strainer pays for itself many times. It protects expensive equipment (traps, control instruments, meters, etc.) and reduces over-all maintenance and service costs.

Assure your system maximum protection from dirt, scale, sludge and sediment . . . specify *the* STRONG strainer designed for your requirements.

**Sizes:** from 1/4" to 8"

**Service:** 250 psi at 450° F to 2500 psi at 1100° F

**Screens:** stainless screens with .027", .045", .062", or .125" perforations (at no extra cost)

**Types:** "Y" or Angle with screwed or socket-weld (flanged) connections

**Materials:** semi-steel, ductile-iron, bronze, Monel, cast or block steel, or new all-stainless or Hasteloy

STRONG'S extensive line of rugged, high-quality strainers are available from your local STRONG distributor. Contact him for assistance in selecting the *right* strainer, or write for your copy of STRONG Bulletin SS-21C.



**STRONG, CARLISLE & HAMMOND**

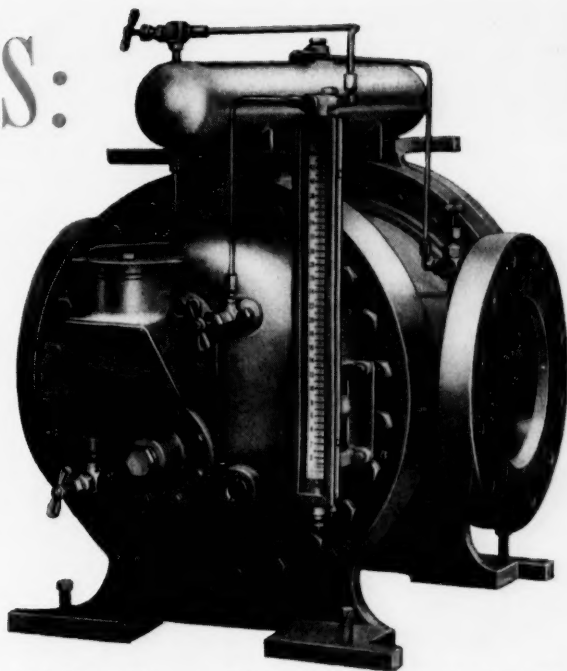
508 Sandusky Street, Conneaut, Ohio

air traps • strainers • reducing valves • vacuum or pumping traps  
 continuous blowdown valves • separators • engine stops • F and T traps • safety headgear



# R-C PRESENTS:

a new line  
of high-pressure  
rotary  
gas meters



## FOR 600 PSIG SERVICE

A new line of 600 psig rotary positive displacement gas meters has been developed by Roots-Connersville to serve the needs of industries requiring extreme measurement accuracy in the higher pressure ranges. The meters are available in 4 sizes covering a range of from 84,000 to 1,600,000 scfh.

THIS NEW METER LINE IS IDEAL  
FOR MANY APPLICATIONS:

- City Gate Metering
- Transmission Line Metering
- Process Gas Metering
- Chemical Gas Manufacturing
- Gas Lifting
- Compressor Stations
- Well Head Measurements
- Steel Mills
- Underground Storage
- Metering of pulsating flow and surges, H<sub>2</sub>, O<sub>2</sub>, CO<sub>2</sub>, NH<sub>3</sub>, LP gas, NO, He, C<sub>2</sub>H<sub>2</sub>, etc.

Write us for additional  
information and data sheets about  
these new Roots-Connersville  
meters for 600 psig service.

R-C rotary gas meters require an absolute minimum of maintenance... assure almost complete freedom from wear... exceptionally high accuracy in metering. A refinement of the basic R-C rotary-positive design which has proved its dependability over the years. These new meters for 600 psig service have incorporated simple in-the-line mounting, straight through flow... high-speed gears... and a welded steel outer case enclosing a steel inner cylinder. Throughout their extra wide operating range, these new R-C meters assure greater accuracy and improved performance in handling a wide variety of gases.

The development of this new meter is another example of R-C's specialized experience of more than 100 years in the design and application of air and gas handling equipment.



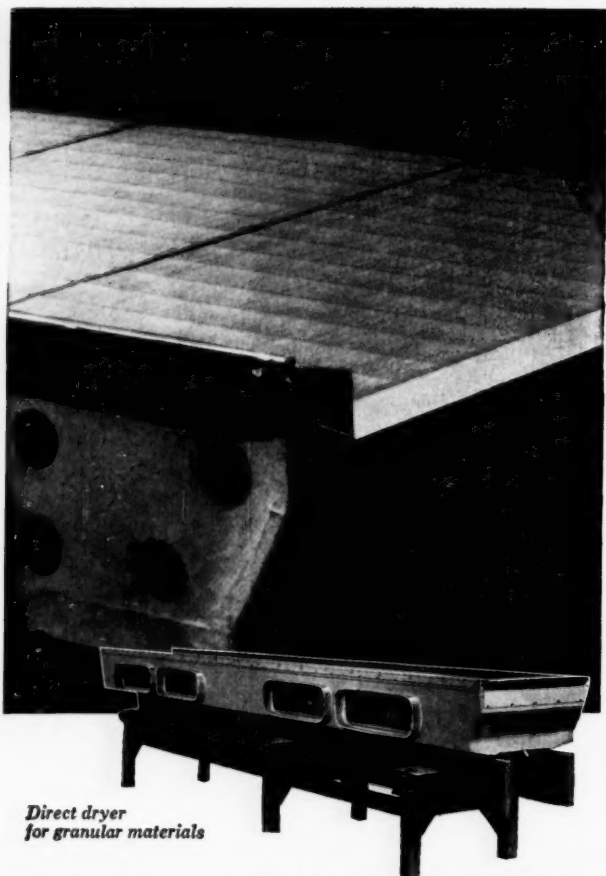
### ROOTS-CONNERSVILLE BLOWER

DIVISION OF DRESSER INDUSTRIES, INC.

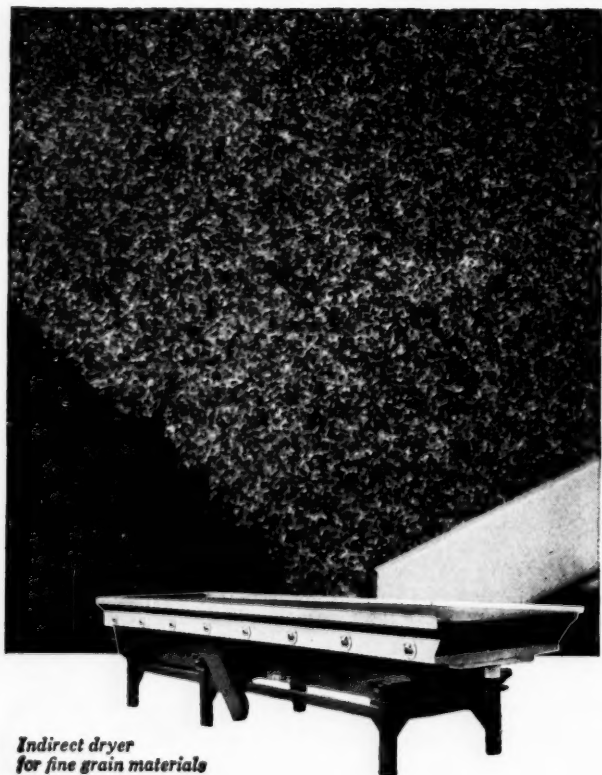
1159 Illinois Ave., Connersville, Indiana. In Canada—629 Adelaide St., W., Toronto







*Direct dryer  
for granular materials*



*Indirect dryer  
for fine grain materials*

**At the Chemical Show...**

*See new Jeffrey equipment  
in operation at booth 97*

## **Continuous drying or cooling at less cost!**

*New Jeffrey units feature  
variable-amplitude mechanical  
vibrating drive*

Now proved in service, Jeffrey's new line of mechanical drive dryers is demonstrating lower maintenance and operating costs, in addition to savings in initial investment. Yet these dryers offer the same operating advantages as electric vibrating systems—variable amplitude drive permits adjusting speed of travel and depth of material as desired. Operation is fully automatic; heat transfer is fast and efficient.

These machines may be used for either drying or cooling and are available in direct or indirect types. They are built in standard lengths of 10 or 20 feet. A tailor-made installation can be assembled from standard components.

The direct dryer is designed to carry granular materials, in the range of  $\frac{1}{4}$ " down to about 60 mesh, on a stainless steel conveying surface through which drying air or gas is passed. The indirect type dryer carries very fine grain materials on a solid plate conveying surface, heated from below by low pressure steam or heated air.

Investigate this new cost cutter. For information write, The Jeffrey Manufacturing Company, 909 North Fourth Street, Columbus 16, Ohio.



**CONVEYING • PROCESSING • MINING EQUIPMENT  
...TRANSMISSION MACHINERY...  
CONTRACT MANUFACTURING**

Now...  
*this much  
horsepower*

*in this much  
space*



New 50 hp. Super "T" V\*S Control Units compared  
with 50 hp. old style drive on Reliance production line.

New Reliance  
**SUPER 'T'**  
**V\*S DRIVES**  
put more  
power into a  
35% smaller  
package

You can increase usable work space and improve machine performance with the New Reliance Super 'T' V\*S Drive. More than just a compact drive, the Super 'T' packs extra punch into its new small size.

Like the Super 'T' Drive Motor, the new control unit uses Class B insulation, and will take repeated 100% overloads of one minute duration. These features plus special control apparatus design and the Super 'T' D-c. Drive Motor actually put more power in less space.

This systematic design balance of power unit, drive motor and controls forms a fast functioning drive to provide a wide range of variable operating speeds from a-c. circuits.

40—150 hp. Super 'T' V\*S available for immediate delivery. Contact your Reliance Sales Engineer for delivery schedules of the complete line, 1—350 hp.

C-1628

*Product of the Reliance Electric and Engineering Company, manufacturers of a-c. motors, Master Gearmotors, Reeves Drives, Super 'T' D-c. Motors, generators, controls and engineered drive systems.*

**RELIANCE** **ELECTRIC AND  
ENGINEERING CO.**

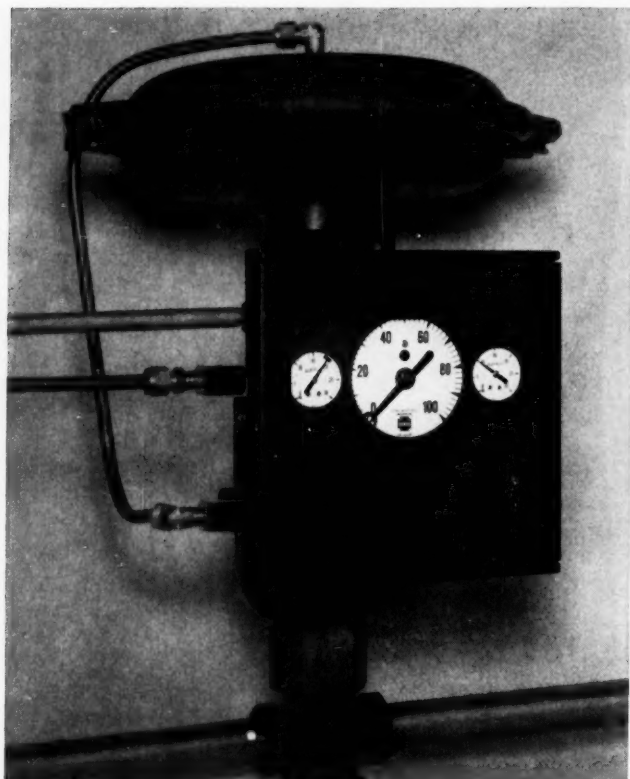
DEPT. 1311A, CLEVELAND 17, OHIO

Canadian Division: Toronto, Ontario

Sales Offices and Distributors in principal cities



# New...from United States Gauge!

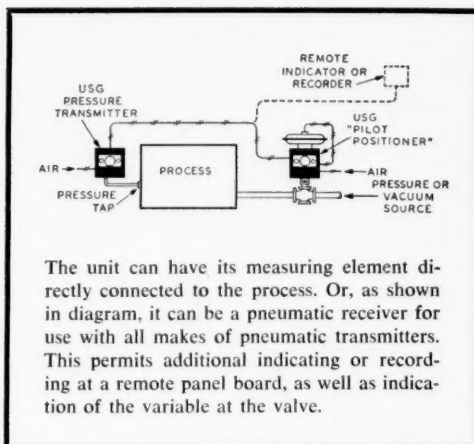


**Wide controller model range.** The USG Pilot-Positioner is available with most controller models in the USG Pilot line. These include pressure measurement from 30 in. Hg vacuum to 10,000 psi (applicable to liquid level as well), and temperature measurement from -350F to 1000F. Also, proportional band, adjustable for 0 to 75%, or adjustable differential gap (for fast-stroking valve). Unit measures a compact 8½ in. square.

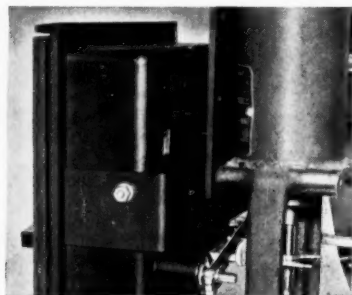
## USG CONTROLLER AND VALVE POSITIONER COMBINED!

... in low-cost, valve-mounted  
**U.S. Gauge Pilot-Positioner**

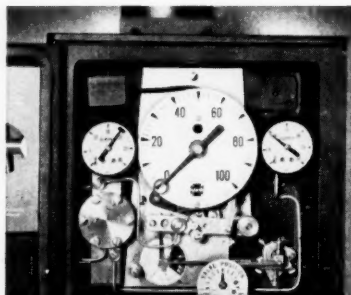
First practical combination of an indicating pneumatic controller and a valve positioner. One compact unit for temperature or pressure control and quick, accurate valve positioning. Check details here. Then send for Bulletin FO29 today!



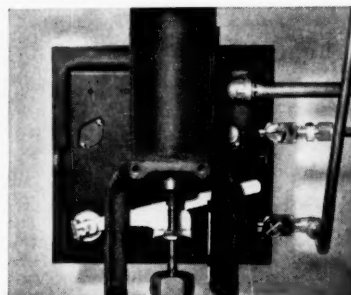
The unit can have its measuring element directly connected to the process. Or, as shown in diagram, it can be a pneumatic receiver for use with all makes of pneumatic transmitters. This permits additional indicating or recording at a remote panel board, as well as indication of the variable at the valve.



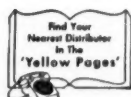
**Eliminates second unit!** Valve-mounted close to the process, the USG Pilot-Positioner minimizes transmission lags, provides higher precision and speed in valve action. Need for separate valve positioner is eliminated, cutting initial cost of two controls and saving on installation and maintenance. Unit fits any standard diaphragm motor valve.



**New non-bleed relay.** Faster, more accurate and positive positioning action is assured with a new USG-designed, high capacity non-bleed relay. A control by-pass panel with manual-automatic-service positions is offered as an option, mounting underneath the instrument case. Another option permits remote pneumatic set point adjustment.



**Mechanical feedback; one air supply.** The new Pilot-Positioner employs mechanical feedback through a lever system. Controller's pneumatic components are used to amplify air pressure. Only one air supply required and pressure can be as high as 65 psi. Adjustable for valve stem travels from ¾ in. to 4 in. Valves can be air-to-open or air-to-close.



**UNITED STATES GAUGE**  
Division of American Machine & Metals, Inc., Sellersville, Penna.



COPPUS

BLUE RIBBON PRODUCTS



Coppus Steam Turbine with Built-In Speed Reducer

**STAMINA** — You can literally see stamina in every dimension of a Coppus Turbine . . . rugged reliability that assures you stable, positive performance. It truly "wins" the Blue Ribbon with which it is marked . . . through advanced design, top quality materials, and thorough testing. With Coppus you're always certain of Blue Ribbon features such as these —

*A totally enclosed governor . . . totally enclosed, independently operated safety trip . . . easily replaceable packing and bearings . . . multiple steam nozzle control . . . brake rim for added safety . . . wide bucket "L" type wheel (optional) for minimum water rate.*

Coppus Turbines are built to customers' specifications, including API and NEMA standards. Sizes from 1 HP to 250 HP. All Coppus Products carry the same Blue Ribbon assurance of reliable performance. For further facts on turbines, send for new Catalog 200. COPPUS ENGINEERING CORPORATION, 232 Park Ave., Worcester, Mass. Sales Offices in *Thomas' Register*.

**COPPUS**  
STEAM TURBINES

# at high TEMPERATURES

## CUT HIGH MAINTENANCE COST— Install **WEDGEPLUGS**

- **No Lubricants Required** for absolute control. Plug Lifts, Turns and Reseats in one quick, easy operation.
- **Non-Sticking**—No field adjustment necessary for variable temperatures.
- **Seats are Protected** against valve-killing erosion of dry and fluid catalyst.
- **Wedgeplugs Have Proven Themselves** to be top performers on such services as hydrocarbon vapors at 900°F. and 600 psi; fluid catalyst at 1125°F. and 255 psi; and, hydrogen at 900°F. and 300 psi.

Motor Operated  
for  
Remote Control



**SOLD THROUGH DISTRIBUTORS  
IN EVERY MAJOR CITY**

Can be supplied: wrench-operated; handwheel-operated; worm gear-operated. Adapted for remote control through use of electric, hydraulic or air motor.

For complete catalog information,  
write to 4013 North 10th Avenue

**WEDGEPLUG VALVE COMPANY**  
Division of  
**STOCKHAM VALVES & FITTINGS**  
GENERAL OFFICES AND PLANT • BIRMINGHAM 2, ALA.

**WEDGEPLUG**  
NON-LUBRICATED  
STEEL PLUG VALVES

**DESIGN ELIMINATES NEED FOR LUBRICATION**



# New!

20 pages of helpful information about J-M Chempac Teflon products...

*Send now for your copy!*

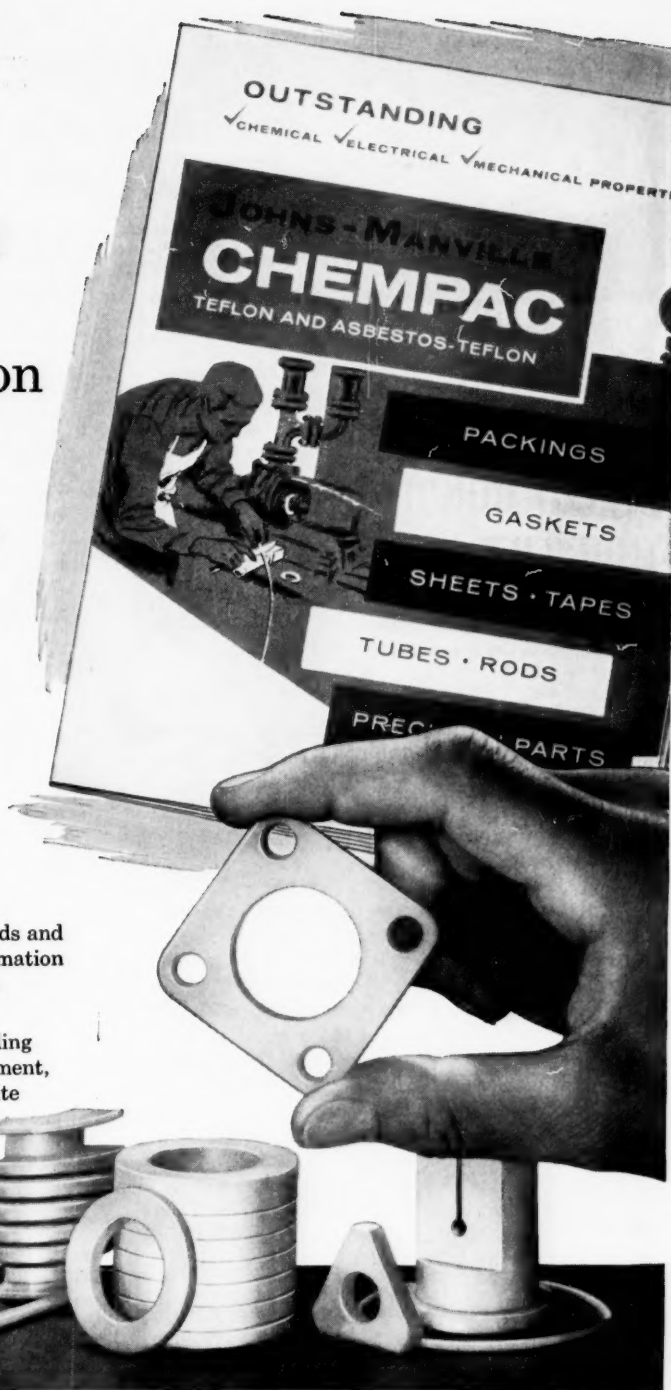
Here's a new ready-reference book that illustrates and describes the broad range of packings, gaskets, sheets, tapes and other components made of J-M Chempac®-Teflon.\*

Its pages are loaded with specific design data, presented in simplest form, that you'll find convenient, accurate and easy to use.

Whether you require rings or cups of high dimensional accuracy... gaskets for applications demanding corrosion and solvent resistance... uniform-density moulded Teflon sheets, skive-cut tapes, moulded or extruded rods and tubes, this book will give you a wealth of information on available sizes and shapes, dimensional data and tolerances.

Whatever your problem dealing with the sealing of corrosives... or protecting electronic equipment, J-M Research facilities are at your service. Write Johns-Manville, Box 14, New York 16, N. Y. for your copy of the Chempac Book PK-124A. In Canada: Port Credit, Ontario.

\*TM for DuPont  
Tetrafluorethylene resin



## JOHNS-MANVILLE



Johns-Manville, Box 14, New York 16, N. Y.

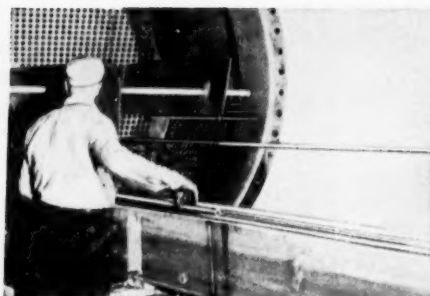
Please send me a free copy of the new Chempac-Teflon Brochure, PK-124A.

Name

Company

Title  Address

City  Zone  State



## CONDENSER AND HEAT EXCHANGER CLINIC

Edited by A. W. Tracy, Metallurgical Engineer  
The American Brass Company, Waterbury, Conn.

### OPERATING FACTORS THAT AFFECT CONDENSER TUBE LIFE

*Answers to some of the questions sent in following a previous clinic on this subject*

**Q.** How effective is chlorination as a preventive maintenance procedure in cleaning tubes fouled by polluted water?

**A.** The chlorination of polluted sea water has been found to be effective in removing or preventing the formation of slimes on the walls of tubes. Better cleanliness was indicated by higher vacuum obtained on the steam side of the condenser. Tubes kept clean by chlorination have been reported to be less subject to pitting. It should be interjected here that tubes carrying polluted sea water containing sulfides from decomposition of organic matter seldom undergo inlet end corrosion, but the remainder of the length of the tubes often becomes pitted. Clean sea water, if entering the tube turbulently, will often cause corrosion at the inlet end, and usually the remainder of the length of the tube is coated with a good protective film of corrosion products.

The statement that chlorination may break down sulfide films on the walls of tubes is based on the fact that chlorine is an oxidizing agent and would oxidize sulfides; however, it is realized that the usual chlorine treatment would probably not remove thick long-standing sulfide scales.

**Q.** How often should tubes be cleaned and what are some of the methods used?

**A.** The required frequency of tube cleaning depends, of course, on how rapidly the tubes become fouled. In some power plants, tubes are cleaned once a week; at other stations, cleaning is required only at intervals of several months. Often the decision to clean tubes is determined by the drop in vacuum on the steam side.

In regard to methods for removing accumulations from condenser tubes, some station operators shoot rubber plugs through the tubes; others use bristle brushes, either of animal hair or nylon. The use of brushes is reported by some to do a better job of cleaning than the use of plugs.

An interesting method for continuously cleaning condenser tubes has been developed in Europe. A large number of sponge rubber balls, slightly larger in diameter than the inner diameter of the tubes and having about the same specific gravity as sea water, is fed continuously into the inlet water box. The cooling water forces the balls through the tubes, and deposits on the tube walls are swept away. The balls are collected by a cone in the outlet water box. They leave the water box through a tube connected to the end of the cone and are recirculated into the inlet water box. By the law of probability, each tube will eventually receive a ball. The system is not applicable to tubes that have been in service and have become rough and pitted.

Some stations periodically remove deposits from tubes by recirculating a dilute, inhibited hydrochloric acid solution through the condenser.

**Q.** How important are temperature and velocity as factors in the service life of condenser tubes?

**A.** Corrosion of condenser tubes is usually more rapid in summer than in the winter, but pollution due to bacterial action in the summer may be a more important factor than temperature itself. Instances have been observed where failures in a set of tubes occurred only in the warm-water months and none in the cold-water months, over a period of several years.

Mention was made in the clinic to the effect that high temperature of water causes pitting, due to the formation of gas bubbles on the tube wall. This type of pitting occurs most frequently, but not often, in oil refinery condensers where temperatures on the vapor side may be as high as 350F and water velocities relatively low. In a power plant condenser, temperatures on the vapor side ordinarily do not exceed 100F and temperature rise in the cooling water from the inlet to the outlet end is usually limited to 10F.

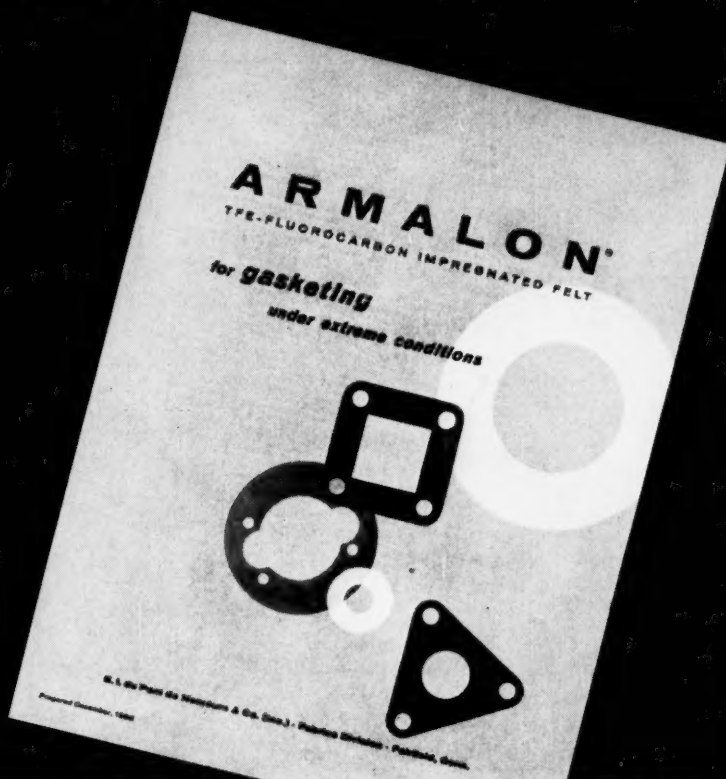
**TECHNICAL ASSISTANCE.** Our Metallurgical Department is regularly helping manufacturers, electric power companies, marine operators, petroleum and chemical companies to select the correct tube alloy for many types of condensers and heat exchangers. This service is available to you without obligation. Write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

ENR

## ANACONDA®

**Tubes and Plates  
FOR CONDENSERS AND HEAT EXCHANGERS**

FROM DU PONT...



#### CONTENTS

Fully describes "Armilon" felts—a new class of gasket materials developed by Du Pont for severe service. Includes:

- Complete data on characteristics—physical properties tabulated for ready reference
- Detailed list of specific applications—indicates how and where "Armilon" performs to best advantage
- 7 case histories describing the service performance of "Armilon" gaskets
- Information on sizes and thicknesses available . . . where to buy "Armilon"

These companies will cut "Armilon" gaskets to your specifications:

W. S. Shamban & Co.  
11617 West Jefferson Blvd.  
Culver City, California

General Plastics Corp.  
165 Third Ave. at E. 26th Street  
Paterson, New Jersey

R. Hurwich Company  
2546 10th Street  
Berkeley, California

Aero Gasket Company  
763 Hanover Road  
Meriden, Connecticut

Cinn. Gasket, Packing & Mfg. Co.  
1507 Elm Street  
Cincinnati 10, Ohio

Southwestern Rubber & Packing Co.  
P. O. Box 5173  
Houston, Texas

Gasket Manufacturing Co., Inc.  
319 West 17th Street  
Los Angeles, California

Russell Gasket Company, Inc.  
7424 Bessemer Avenue  
Cleveland 27, Ohio

## Free booklet tells how you can reduce gasketing costs

If you're troubled with constant gasket failure, you'll want a copy of "Armilon"—for gasketing under extreme conditions. "Armilon" \*\* TFE-fluorocarbon impregnated felts withstand temperatures from -100°F. to 400°F., resist strong acids and bases—including red fuming  $\text{HNO}_3$ . "Armilon" gaskets seal securely and last months, even years, longer than

other materials. For examples of how these amazing materials are being used to lower operation costs throughout industry, and complete technical data on Du Pont "Armilon"\*. . . send for the booklet illustrated. Clip the coupon now. Mail to E. I. du Pont de Nemours & Co. (Inc.), Fabrics Div., Dept. CE-911, Wilmington 98, Delaware.

\*"Armilon" is Du Pont's registered trademark for its TFE-fluorocarbon resin impregnated felts.  
\*\*"Armilon" TFE-fluorocarbon impregnated felt is covered by U. S. Patent 2,764,506.

**DU PONT INDUSTRIAL  
COATED FABRICS**



REG. U. S. PAT. OFF.  
BETTER THINGS FOR BETTER LIVING  
. . . THROUGH CHEMISTRY

**MAIL COUPON TODAY**

E. I. du Pont de Nemours & Co. (Inc.)  
Fabrics Division, Dept. CE-911.  
Wilmington 98, Delaware

Please send me a copy of "Armilon"—for gasketing under extreme conditions.

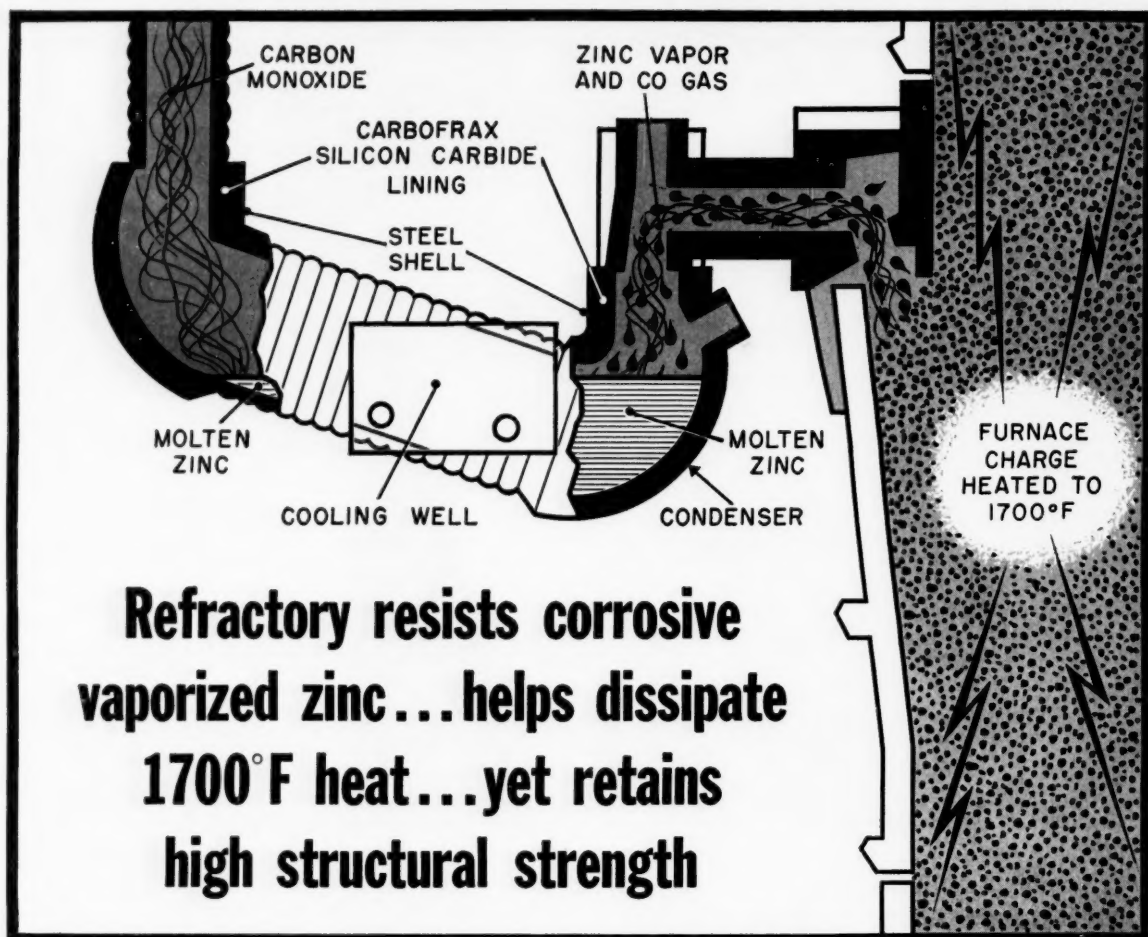
Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

*It took one of Carborundum's refractories to solve this problem:*



A major producer of high purity zinc reduces zinc ore by an electro-thermic process. Sintered ore and coke, heated in a resistance furnace to approximately 1700° F, produce vaporized zinc and carbon monoxide. Collected in a vapor ring, these gases pass into a condenser containing a large amount of molten zinc. Here, the vaporized metal is condensed and the carbon monoxide exhausted.

Refractory linings for the vapor ring, condenser and tapping well must not only possess high hot strength, but also withstand the intensely corrosive action of the molten and vaporized metal. They must also be impermeable to gas seepage. In addition, high thermal conductivity is required, since huge amounts of heat must be dissipated to obtain rapid cooling of the zinc vapor.

This tough combination of requirements is met by one of Carborundum's refractories—CARBOFRAX® silicone carbide. It has exceptional load bearing strength at high temperatures

(300 psi at 2750° F without crushing) and almost complete impermeability to gases. CARBOFRAX refractories are also chemically inert—resist most acids, acid sludges and fluxes, and molten and vaporized zinc. Moreover, thermal conductivity is high—11 times greater than fireclay.

Properties such as these may be the answer to a problem in your plant. If even the best of standard materials fail to give the performance you need, consider Carborundum's refractories. There is a wide range of products to meet the requirements of almost every type of application.

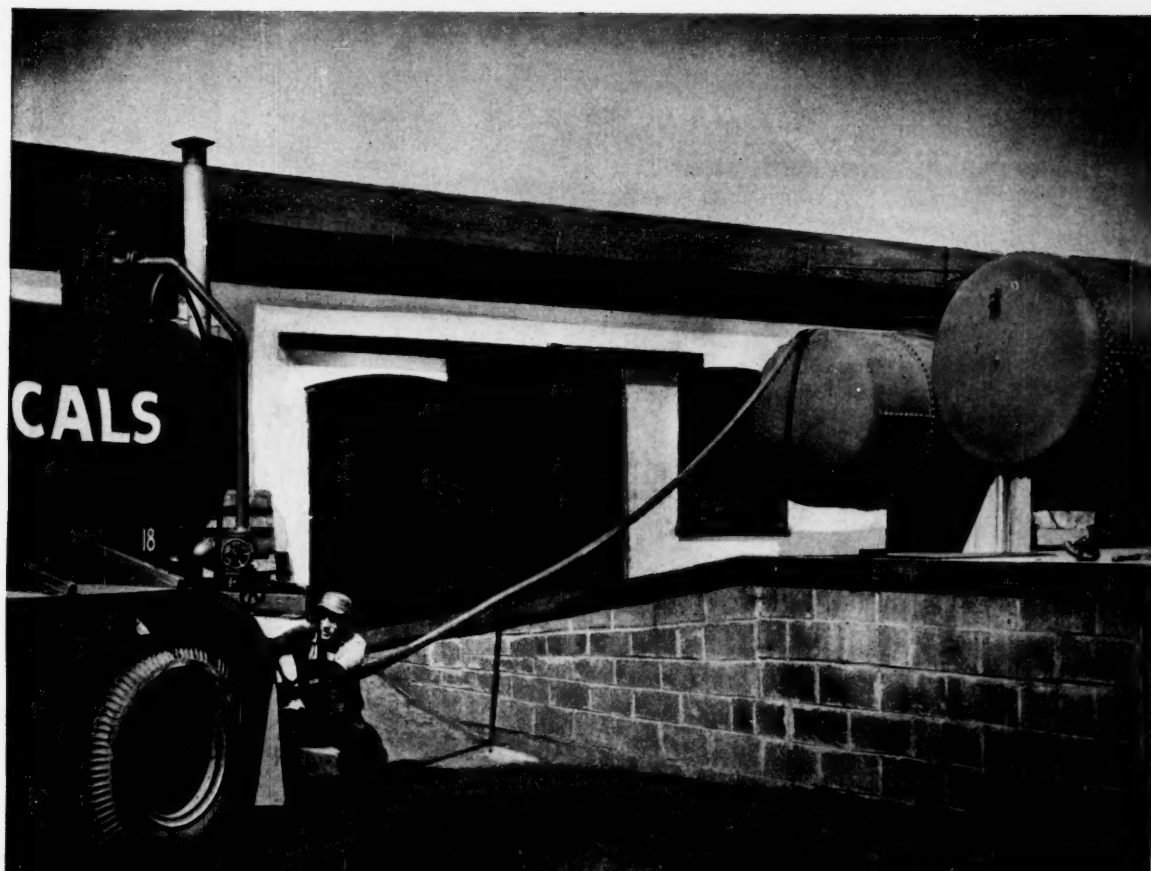
Write today for your free copy of "Super Refractories by Carborundum." The address: Dept. H-119, Refractories Div., Perth Amboy, New Jersey.



**CARBORUNDUM**

Registered Trade Mark





## Better than any other acid hose we've ever used

After handling many makes of acid hose the chemical operator at this plant has found that Acme-Hamilton acid discharge hose is outlasting the others, remains flexible even when cold, and is highly resistant to weathering. This A-H hose has been in service 2 years conveying 2,000 gallons of commercial sulphuric acid per week.

### Acid Discharge Hose

- (A) Cover. Tough abrasion and acid resistant rubber. Hose ends are rubber sealed.
- (B) Carcass. Multiple fabric plies withstand pumping pressures, provide high degree of flexibility.
- (C) Tube. Pure gum; will handle wide range of acids, salts and alkalis. (Can also be furnished with Hypalon\* tube for special applications.)

Write Dept. C-1. \*Du Pont T. M.

# Acme Hamilton

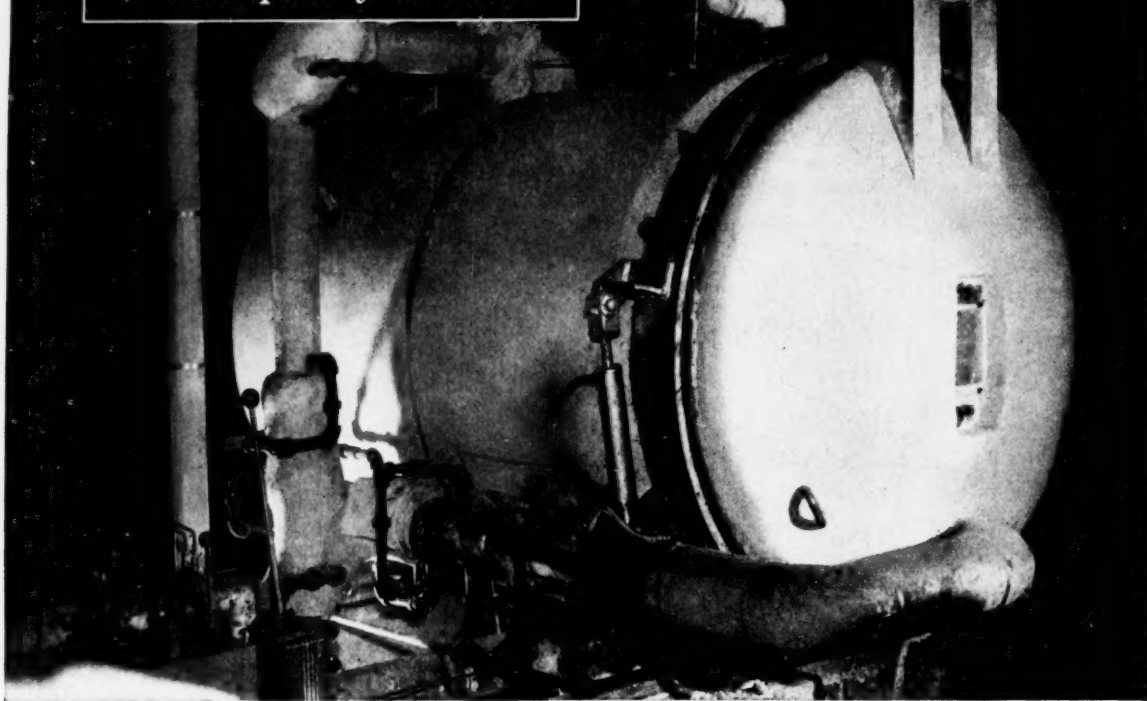
MANUFACTURING CORPORATION, TRENTON 3, N. J.

Divisions: Acme Rubber Mfg. Co. • Hamilton Rubber Mfg. Corp.

ATLANTA • CHICAGO • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES  
MILWAUKEE • NEW YORK • PITTSBURGH • SALT LAKE CITY • SAN FRANCISCO • SEATTLE



**INDUSTRIAL at WORK**  
...on quality control



## How STAUFFER CHEMICAL modernization pays off in improved sulphur quality

Improved sulphur quality and an increase in purification production were Stauffer Chemical's aims in a recent modernization program at their Chester, Pennsylvania operation.

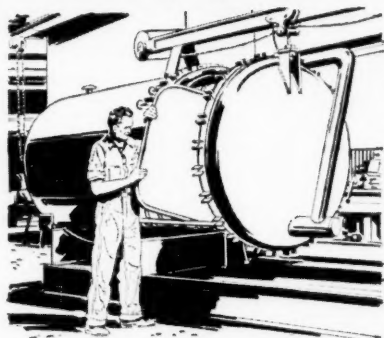
Playing an important role in these now realized goals was this type 122 *Industrial* horizontal filter. Here's how it helped Stauffer to:

**IMPROVE QUALITY.** Hand skimming of settled carbon from open troughs has been eliminated, permitting major improvements in quality control and optimum carbon removal through filter.

**SPEED PURIFICATION.** The *Industrial* filter is designed to handle both ash and carbon in one automatic operation. Raw sulphur is melted, purified and then pumped directly to processing.

In addition, the *Industrial* filter operation occupies *less* space because with settling eliminated—so is their need for tertiary tanks.

The *Stauffer* modernization story is typical of how quality-conscious processors throughout industry are turning to *Industrial*-engineered systems to help meet their customer requirements for more, but *better*, products . . . through controlled filtration.



*Industrial's* "lift out" leaves speed screen replacement and give easy access for filter maintenance. At Stauffer Chemical Company, extra-heavy bolted leaf construction and hydraulic leaf extractor automate operation.

WRITE FOR  
BULLETIN 122



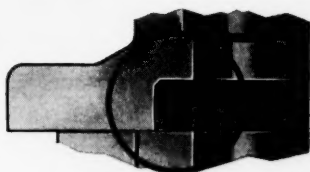
**INDUSTRIAL FILTER & PUMP MFG. CO.**

5918 Ogden Avenue, Cicero 50, Illinois

See *Industrial* Booths 1188-1202 New York Chemical Exposition

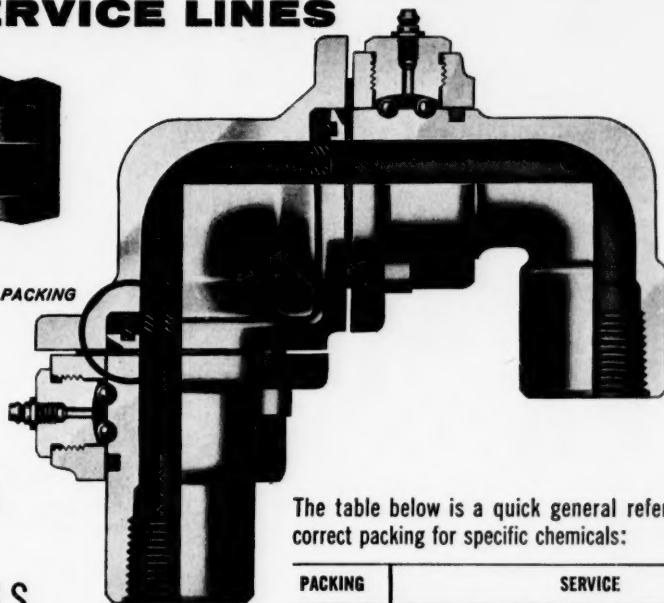
**INDUSTRIAL**

# NEW **CHIKSAN** SWIVEL JOINT GIVES SAFE, LASTING FLEXIBILITY TO CHEMICAL SERVICE LINES



VIEW ABOVE SHOWS MOLDED PACKING

VIEW AT RIGHT SHOWS DISC PACKING



**INTERCHANGEABLE  
PACKING FEATURE  
ENABLES DS SERIES  
TO HANDLE A WIDE  
RANGE OF CHEMICALS  
IN SERVICES FROM -65°F  
TO +400°F AT 300 PSI**

The DS Series swivel joint with its broad service range can be a valuable new tool in your process system. Use it in chemical loading of tank car or tank truck, for stress relief in piping subjected to vibration, expansion or settling, or as a steam rotation connection between stationary and revolving equipment. Wherever you use it, you'll find it pays for itself in extended service life.

Using a disc or molded type packing, this swivel joint can be applied to handle steam and any of a wide variety of chemicals processed in your plant. And the split segment feature of the DS Swivel Joint allows replacement of packings without removing the joint from the line.

Buy and apply Chiksan DS Series Swivel Joints for chemical service lines in your plant now. You can select from eight basic styles for full rotation in one, two or three planes. For more information write to Chiksan or fill in the coupon below.



The table below is a quick general reference for the correct packing for specific chemicals:

PACKING	SERVICE
Neoprene	Recommended for alkaline and acid salt solutions and aldehydes such as formaldehyde.
Hycar	These should be used for petroleum derivatives, neutral or slightly acidic salt solutions, dilute acids (Sulfuric to 50%, Hydrochloric and Nitric to 20%), alcohols, glycols, ethers, gases (Oxygen not over 500 psi), and vegetable oils.
Butyl	Recommended for liquid or anhydrous ammonia, gases (except oxygen over 500 psi), ammonia derivatives such as hydrazine and for certain hydraulic fluids such as Pydraul, Skydrol, and Cellulube. It is recommended for acetone and methyl ethyl ketone.
Teflon*	Used for concentrated or fuming acids and other highly oxidizing fluids, esters, aromatics, liquid chlorine, bromine and fluorine if temperature is not excessive.
Asbestos	For use in saturated steam service.
Viton "A"	Recommended for use with concentrated acids, aromatics, liquid chlorine, liquid bromine, chlorine or bromine derivatives, molten sulfur, and carbon disulfide.
Metallic	For extreme services such as hot gas at 600°F., a Stainless Steel metal disc, specially treated to prevent galling, is recommended.

\* R.T.M. DU PONT

CHIKSAN COMPANY, 330 North Pomona Ave., Brea, California

Please send me copy of Bulletin No. 1258

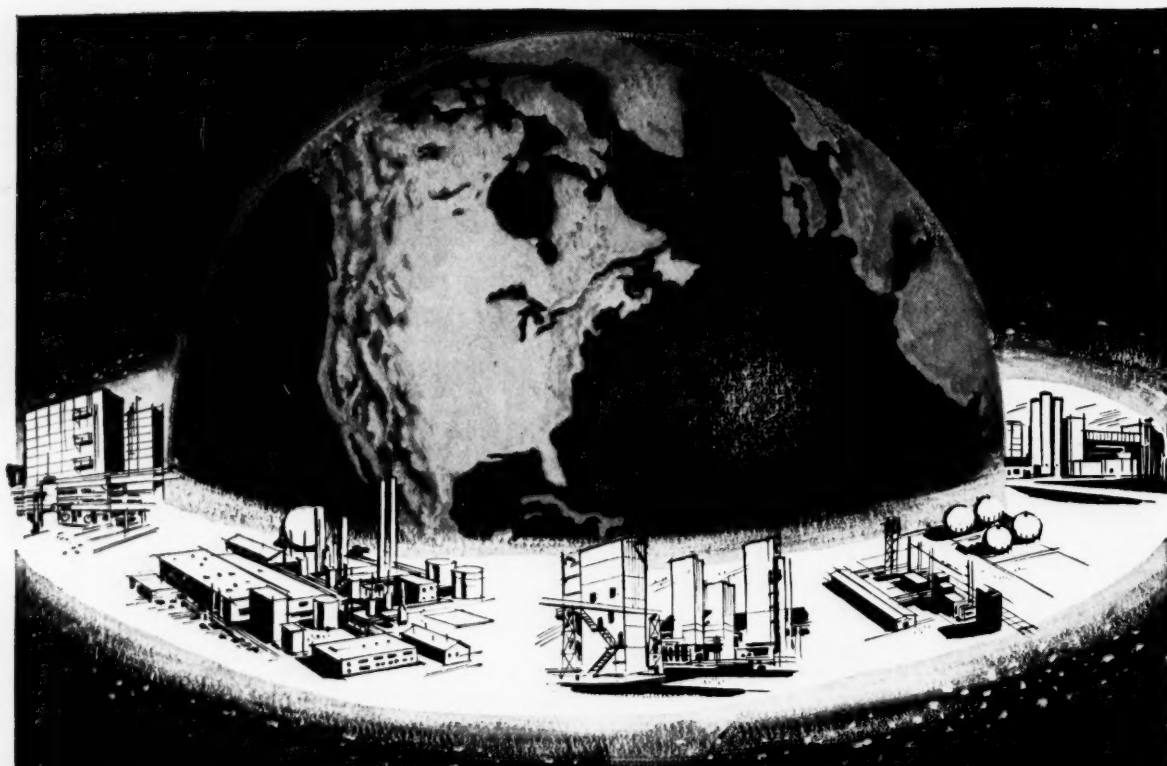
Name \_\_\_\_\_  
 Company \_\_\_\_\_ Title \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

#59-46

**CHIKSAN** 

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY—Brea, California • Chicago 5, Ill. • Newark 2, N.J. • Weco (Division), Houston 24, Texas • Subsidiaries: Chiksan Export Co. • Chiksan of Canada Ltd.



# EXPERIENCE

*is always* **on stream** *with* **AIR LIQUIDE**

If you're planning to build a new plant — to extend — or to rebuild . . . tap this rich stream of low-temperature experience! If it's a question of gas separation or recovery, Air Liquide has the efficient, economical, proven answer.

The Air Liquide stream of experience has been flowing around the world for over half a century. Gaining year by year broader and accurate know-how, it has produced hundreds of low-temperature gas separation plants all over the globe.

Whether you need a plant from an existing design or one especially designed for your particular require-

ments, Air Liquide can supply it. From the initial technical consultations, design work, manufacturing of plant and equipment, to the expert erection and start-up supervision, our widely experienced Research, Design, and Project teams smoothly coordinate with yours.

We shall be pleased to consult with you in the application of Air Liquide processes and equipment to your particular needs. Write or call us at 405 Lexington Ave., New York 17, N. Y. Telephone: YUkon 6-6544.

## AIR LIQUIDE HAVE DESIGNED AND BUILT THE FOLLOWING TYPES OF PLANTS

- Air Separation — oxygen, nitrogen, etc.
- Tonnage Oxygen and Nitrogen (Gas and Liquid)
- Rare Gases Recovery
- CO<sub>2</sub> Purification
- Methane Purification
- Natural Gas Liquefaction
- Coke-Oven Gas Separation
- Refinery Gas Separation
- Hydrogen Liquefaction
- Helium Recovery
- Pure CO<sub>2</sub> Production
- Heavy Water for Atomic Reactors

### IN CANADA:

L'Air Liquide,  
1111 Beaver Hall Hill,  
Montreal, Quebec,  
Telephone: UNiversity 6-4781



AMERICAN

# AIR LIQUIDE

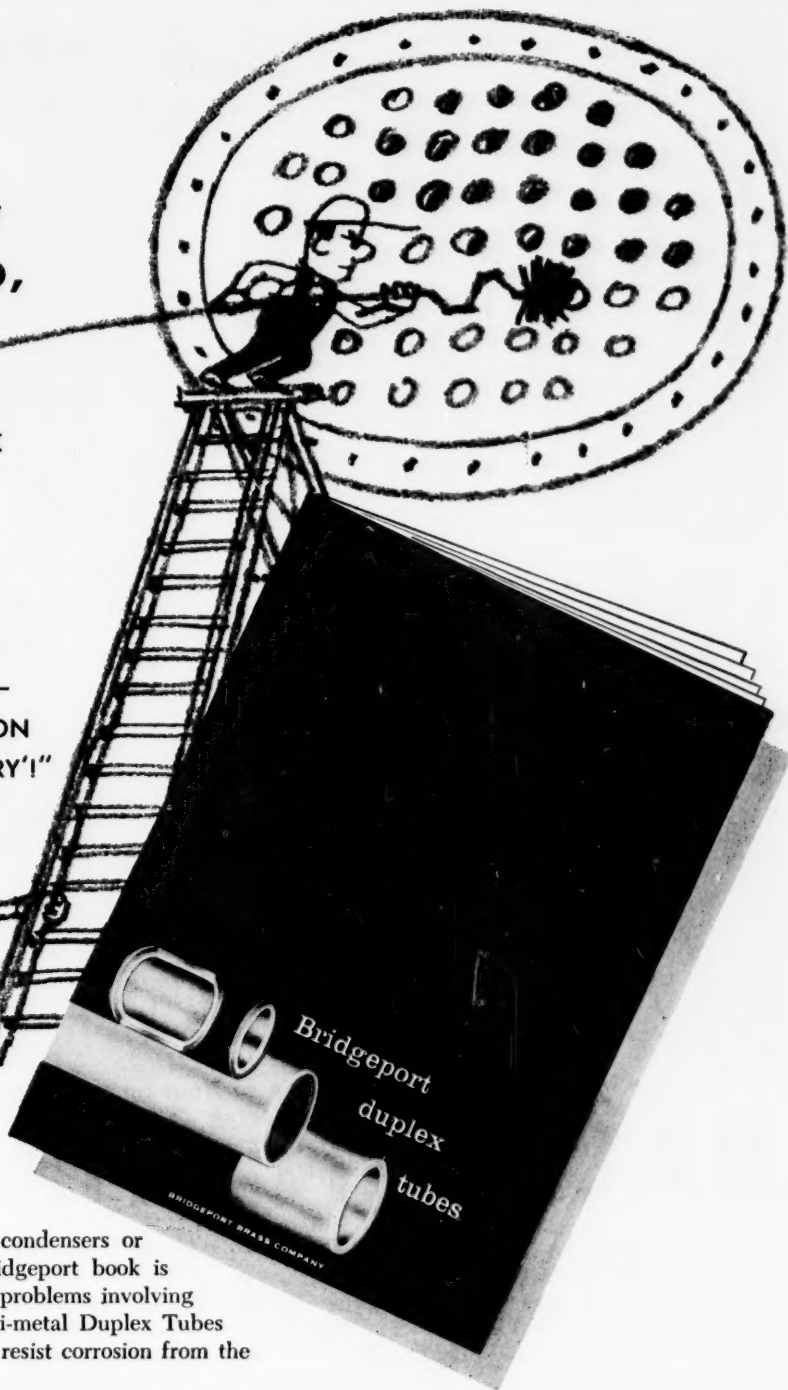
ENGINEERING & CONSTRUCTION DIVISION

OLDEST IN EXPERIENCE — NEWEST IN DESIGN

405 LEXINGTON AVE., NEW YORK 17, N.Y.

**"FRANKLY  
HOPWOOD,**

DON'T YOU THINK  
IT WOULD BE  
MUCH MORE  
PRACTICAL  
IF WE SENT FOR  
**BRIDGEPORT'S**  
FREE NEW BOOK—  
'SOLVING CORROSION  
PROBLEMS IN INDUSTRY!'



If you convey anything through condensers or heat exchangers, this 20-page Bridgeport book is must reading. It tells how to lick problems involving two corrosive media...by using bi-metal Duplex Tubes ...each metal surface designed to resist corrosion from the media to which it is exposed.

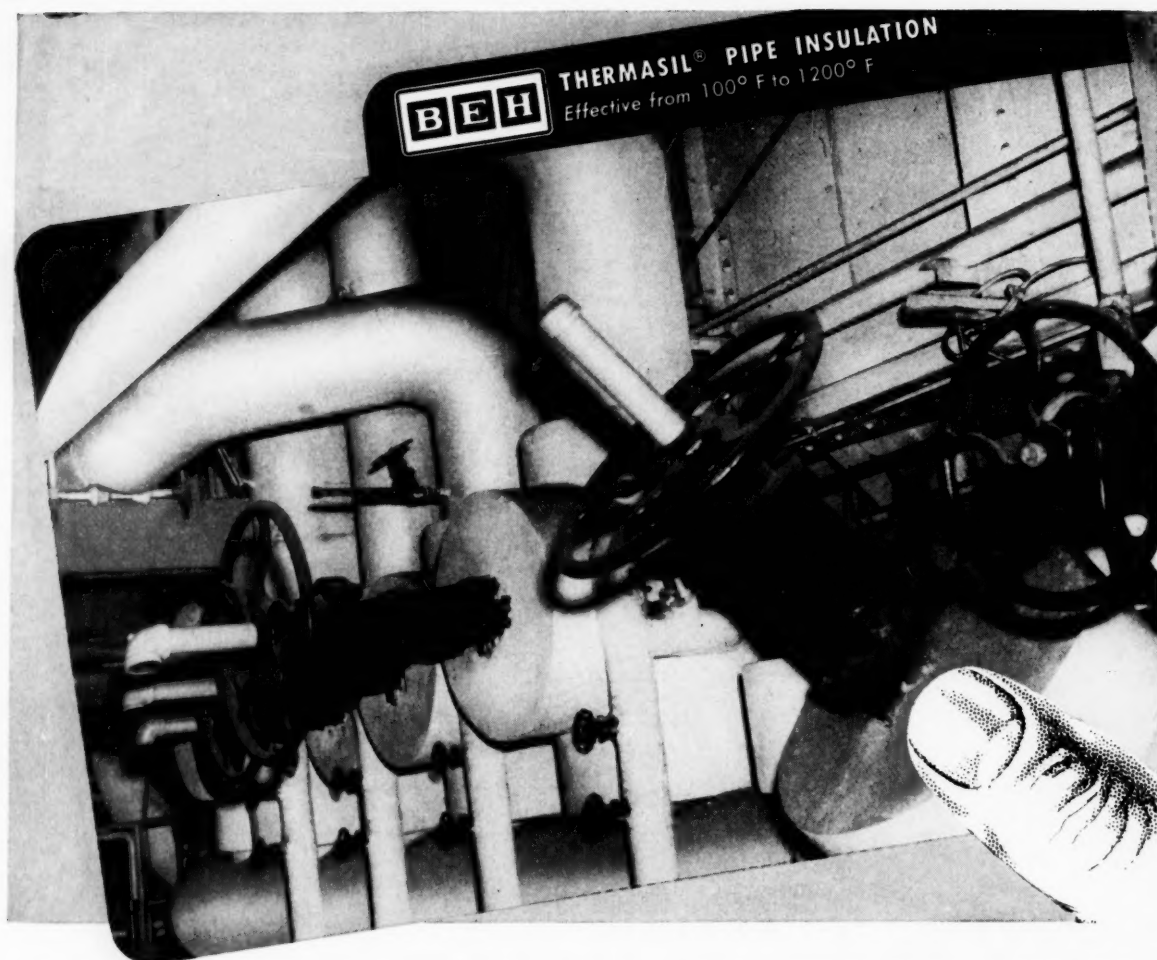
Each industry has its own corrosion problems, and this fact-packed book illustrates ways to solve many of them. For your personal copy, just write, on your company letterhead, to the Bridgeport Brass Company, Bridgeport 2, Connecticut. Please address Dept. 5013



**BRIDGEPORT BRASS COMPANY**

Bridgeport 2, Connecticut • Sales Offices in Principal Cities  
*Specialists in Metals from Aluminum to Zirconium*





## THEY'RE SAVING MONEY WITH THERMASIL

*Another famous name in the full line of Heat and Cold Insulations manufactured by*

# BALDWIN-EHRET-HILL

They certainly are saving money — and you will too — with B-E-H THERMASIL calcium silicate in application, low maintenance and long service life. It is molded — not machined — to exact finished sizes. This assures that both inside and outside surfaces are tough, smooth and dust-free with dimensions held to close tolerances, providing a tight, uniform fit. THERMASIL is exceptionally light in weight, permit-

ting easy and fast application; is readily cut, sawed, scored, drilled with standard tools — no special fabricating equipment required. It is unaffected by water or weather; has high structural strength — good for the life of the equipment it insulates. For information on B-E-H THERMASIL and other dependable B-E-H Insulations, write for catalog. Contract application service available coast to coast.

## BALDWIN-EHRET-HILL, INC.

*Manufacturers of a complete line of Heat and Cold Insulations from Minus 460°F to 1900°F*

**1511 Breunig Avenue Trenton 2, N. J.**

**SALES OFFICES:**

NEW YORK, N.Y.  
Bryant 9-3996

CHICAGO, ILL.  
Harrison 7-0885

PHILADELPHIA, PA.  
Baldwin 9-6531

TRENTON, N.J.  
EXport 6-4571

HUNTINGTON, IND.  
Huntington 124

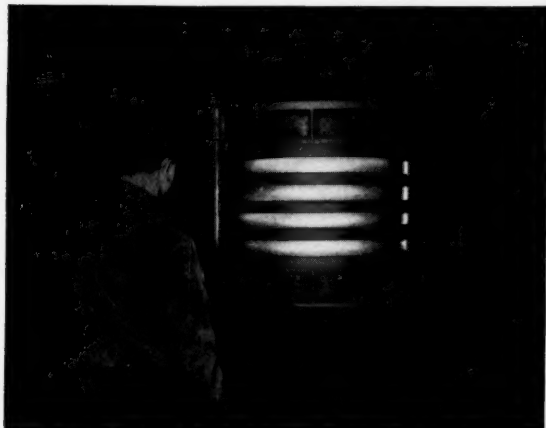
HOUSTON, TEX.  
Jackson 3-7397

TEMPLE, TEX.  
Prospect 3-2197

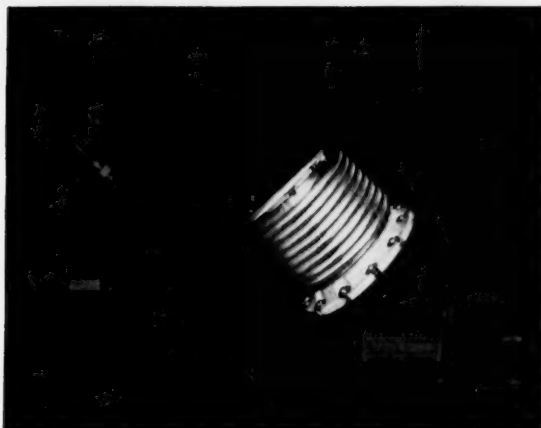




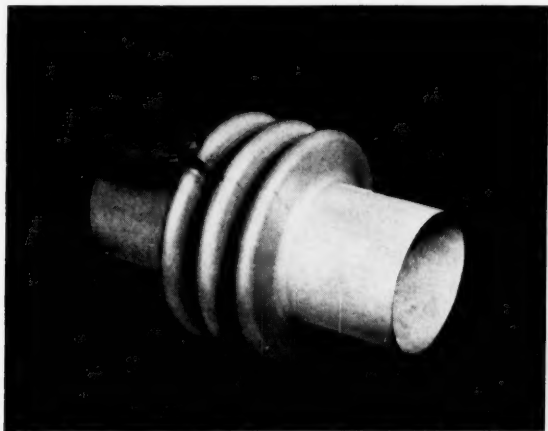
# 4 WAYS to get maximum reliability in expansion joints



**1** Insist that the corrugated bellows be hydraulically formed. The reason is simple. Whenever bellows are formed by circumferential welding . . . whether by edge, seam or fillet welding . . . they will always be subject to premature failure because of stress concentrations at the welds.



**2** Be sure the manufacturer maintains a continuous and comprehensive program of endurance testing. This is basic, because of the many variables that affect expansion joint life. Accurate determination of expansion joint life expectancy can only be determined by cycling to destruction.



**3** Demand proof that the manufacturer can produce longitudinal welds in the corrugated bellows having the same strength, physical properties and thickness as the parent metal . . . without grinding. A weld that is hard to find is a ground weld. Variations in weld thickness set up points of stress concentration . . . opening the way for premature failure.

At Zallea, none of the many factors affecting expansion joint reliability are left to guesswork . . . including the four vital ones above.

This is reflected in these facts. Zallea material specifications are the most exacting in the industry. Zallea expansion joints are hydraulically formed. Zallea advanced welding techniques insure welds having the same thick-



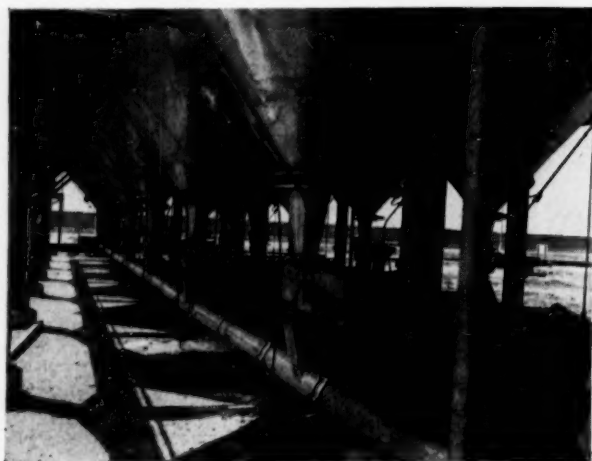
**4** Check the ability of the manufacturer to supply a team of competent design and application specialists to work with your engineers. Check their specific experience in handling critical, complex applications in your field . . . complete to the record of successes or failures behind them, and details of how this experience will be brought to bear on your problem.

ness, strength and physical properties as the parent metal. Zallea has done more cyclic testing to destruction than all government agencies and industrial firms combined. Zallea has produced more expansion joints than any other manufacturer . . . offers more application engineering experience.

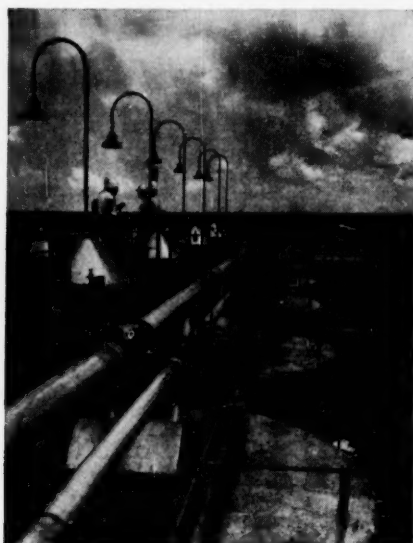
For all the facts, write for Catalog 56. Zallea Brothers, Taylor and Locust Streets, Wilmington 99, Delaware.

*Zallea* for maximum reliability

**ZALLEA BROTHERS, Wilmington 99, Delaware • World's largest manufacturer of expansion joints**



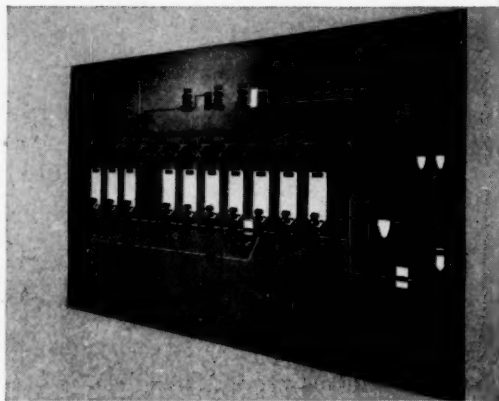
1. Installation at an ultra-modern plant of one of the largest companies in the chemical field. Shown are storage bins with airtight automatically operated discharge gates.



3. Series of bins served by pneumatic conveyor systems with diverter valves.



2. Transfer station, handling polyethylene pellets at rates of 60,000 lbs. per hour, receives materials delivered from any one of several points under vacuum; transfers them to the pressure side of the system for delivery to any one of several discharge points.



4. Graphic control panel built for explosion-proof service. Permits operator to direct flow of materials through proper channels from one central location.

**IF YOU PLAN TO HANDLE BULK CHEMICALS  
DON'T BUY UNTIL YOU CONSIDER**

## ***National* PNEUMATIC CONVEYORS**

If your plant handles fine dry materials in quantity, let National survey your needs and submit a prompt proposal. Chas. Pfizer & Co., Inc., U.S. Rubber Co., U.S. Steel Corp., and many other leading companies have made National their choice. National is equipped to design, build and install your complete pneumatic conveyor system... or an addition to your present one. Our testing laboratory is available to determine precise

handling requirements for your materials. All this can be done under one contract and one responsibility by a company that can move quickly. Many of the nation's largest chemical companies have returned to National for repeat installations... sure testimony to their satisfaction with National's performance. Consult National now... write us or our nearest representative listed below.

**SEND FOR FREE BULLETIN P58-G**  
on pneumatic conveyor systems  
for handling dry granular materials.

For additional information, consult  
**Chemical Engineering Catalog and  
Sweet's Catalog**

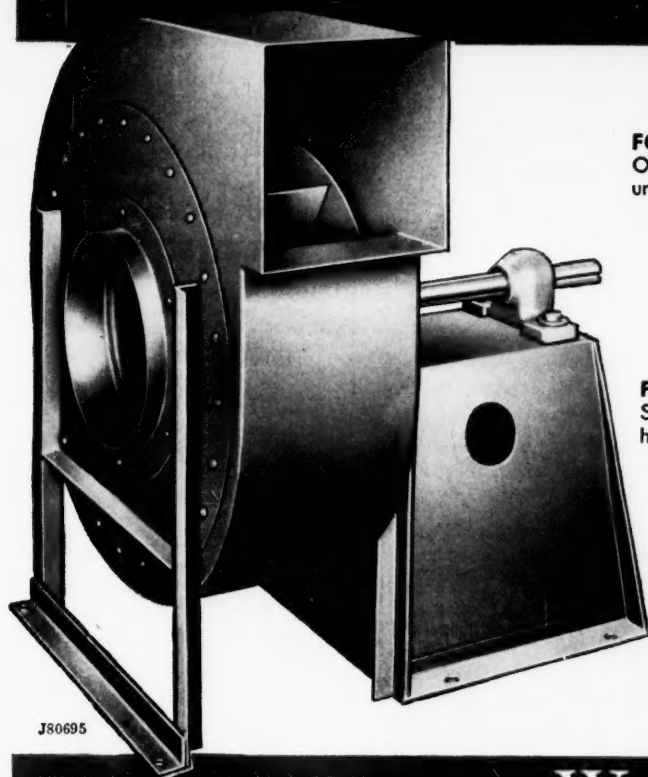


Also manufacturers of: **National ChipVeyor Systems** for the collection and processing of metal chips and borings and reclamation of cutting oils (send for Bulletin C-56). **Conveyors** for press scrap and small parts. **National Ash Conveyor Systems** for handling ash and fly ash (send for Bulletin P-57A).

### **REPRESENTATIVES**

**ATLANTA 3, Ga.**—P. H. Nichols & Co.—400 Whitehead Bldg. • **BALTIMORE 18, Md.**—Lamb Engineering Co.—2125 Maryland Ave. • **BOSTON 94, Mass.**—Mills Engineering Co., Inc.—300 First Ave., Needham Hts. • **BUFFALO 2, N. Y.**—Charles P. Hague, Inc.—625 Delaware Ave., Rm. 202 • **CHARLOTTE 9, N. C.**—E. L. Mountcastle—2617 Selwyn Ave. • **CHICAGO 4, Ill.**—Burke & Colston (Ash)—53 W. Jackson Blvd. • **CHICAGO 5, Ill.**—Mayer & Oswald (Chip)—407 S. Dearborn St. • **CINCINNATI 27, Ohio**—Smith E. Hughes—3716 Petoskey Ave. • **CLEVELAND (Lakewood 7), Ohio**—J. Harry Haywood—12031 Edgewater Dr. • **DETROIT (Ferndale 20), Mich.**—Beltaire-Drissen—570 Livernois Ave. • **HARTFORD, Conn.**—Dee Engineering Co.—Cromwell, Conn. • **HOUSTON 5, Texas**—Industrial Handling Engineers—1200 Bissonnet • **LOS ANGELES 13, Calif.**—W. F. Huff and Co.—417 S. Hill St. • **PHILADELPHIA, Pa.**—C. V. McQuary—P. O. Box 52, Cheltenham, Pa. • **PITTSBURGH 29, Pa.**—Gibson & Stanier Engineered Products—P. O. Box 9742 • **ST. LOUIS 22, Mo.**—Medor, Inc.—10408 Manchester Ave.

# NEW Westinghouse Industrial Fans Do All These Jobs Better

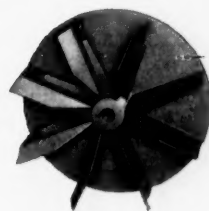


J80695

**FOR MATERIAL HANDLING:**  
Open radial blade wheel with  
unobstructed air passages.



**FOR STRINGY MATERIALS:**  
Strong backplate wheel easily  
handles fibrous materials.



**FOR EXHAUST, CIRCULATION:**  
Improved design with  
backwardly inclined blades  
for low horsepower.



## Westinghouse

Whatever  
your  
process  
equipment  
needs



call  
**ARTISAN**

Whether you need a single piece of process equipment or a complete pilot plant tailored to your specifications, the shortest, most economical distance between problem and solution is a call to your Artisan representative. Here are 3 practical reasons why:

- 1... Artisan offers *complete service* — from design through manufacture. Artisan's large staff of chemical and mechanical engineers is experienced in all phases of process equipment design.
- 2... Artisan offers *superior manufacturing capability*. Ample facilities, modern equipment, manned by skilled craftsmen who have spent a quarter century turning out quality equipment for the process industries.
- 3... Artisan offers *economy, on-time delivery*. Complete, one-stop service, with careful control at every step makes possible important economies all along the line, insures delivery as promised.

You'll find that Artisan *cooperates*, whether your problem is large or small. So phone today — or, write direct. You'll get a speedy, specific reply at no obligation.



**FREE** — *Fact-packed folder gives complete information on each of Artisan Industries' many services. Invaluable reference material for anyone who will ever need process equipment. Write for your copy today.*

*Specialists in process equipment and pilot plants* — Evaporation • Distillation • Waste recovery • Heat transfer • Solvent extraction and recovery • Organic synthesis • Nuclear process equipment

*Specialists in mechanical equipment* — Test equipment • Special machines • Packaging equipment • Continuous transfer and treating equipment • Nuclear mechanical devices



**ARTISAN**

**METAL PRODUCTS, INC.**

76 Pond Street, Waltham 54, Mass., TWInbrook 3-6800

SEE YOU AT THE CHEM. SHOW, BOOTH 874

Call your nearest  
**ARTISAN**  
representative

**CHEMICAL PUMP & EQUIPMENT CORP.**  
Jersey City, N. J. — BOwling Green 9-7544

**CHEMICAL PUMP & EQUIPMENT CORP.  
OF CLEVELAND**  
Cleveland 20, Ohio — LOngacre 1-3025

**ENGINEERED PROCESS EQUIPMENT COMPANY**  
Pasadena, Cal. — MUrray 1-6663

**ENGINEERED PROCESS EQUIPMENT COMPANY**  
Oakland, Cal. — TEmplebar 2-5391

**THE HAINGE COMPANY**  
Houston 27, Texas — JAckson 9-2573

**INDUSTRIAL EQUIPMENT COMPANY, INC.**  
Charleston 23, W. Va. — DIckens 3-7606

**W. H. KIDD & COMPANY**  
Richmond 19, Va. — MIlford 8-9240

**W. L. MARPLE & ASSOCIATES**  
Blue Bell, Pa. — MIttchell 6-2330

**SOUTHEAST ENGINEERS, INC.**  
Birmingham, Ala. — LYric 2-7201

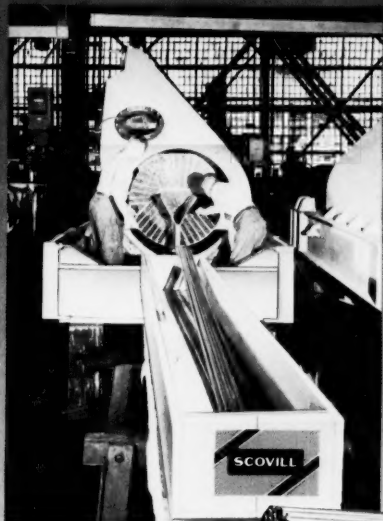
**STOLLEY & ORLEBEKE**  
Chicago 6, Ill. — DEarborn 2-1737

a symbol  
of  
excellence



**ARTISAN INDUSTRIES**

where trouble-free performance is a matter of  
national security



each of newest  
nuclear subs  
will take aboard,  
**MORE THAN**  
**4 MILES**  
of Scovill  
cupro-nickel, 30%  
heat exchanger tube

**SCOVILL**

We're proud to be making this important contribution to the long-service dependability of these nuclear-powered submarines.

Like all other components of their nuclear-powered propulsion machinery and equipment, the Foster Wheeler main condensers, shown above being tubed with Scovill Cupro-Nickel, 30% Heat Exchanger Tube, have passed the most exhaustive performance tests it has been possible to devise. The same tube specification is also being installed in the ejector condensers. All of the tube is electronically tested on new equipment at the Scovill Tube Mills before delivery.

Scovill Cupro-Nickel, 30% Heat Exchanger Tube has a long record of trouble-free service on U. S. Naval vessels and those of many other nations. It is a first choice of design and operating engineers where salt water or corrosion conditions are severe, particularly at elevated temperatures and when the circulating media travel at high velocities. The corrosion resistance is excellent; strength of the alloy remains constant over a wide temperature range.

Why not discuss your own heat exchanger tube conditions and problems with Scovill Technical Service . . . considered by many the most experienced in the field.

#### HEAT EXCHANGER TUBE

for Applications from Marine to Petrochemical, from Compressor Intercoolers to "Cat-Cracker" Exchangers, in these popular Alloys . . . Phosphorized Admiralty • Admiralty • Arsenical Admiralty • Red Brass, 85% • Deoxidized Copper • Arsenical Copper • Cupro-Nickel, 10%-20%-30% • Aluminum Brass • Aluminum Bronze, 5% • Muntz Metal • Duplex Tube.

SCOVILL MANUFACTURING COMPANY, Mill Products Division, 99 Mill Street, Waterbury 20, Connecticut. Phone PLaza 4-1171.



18SC59





News from

# National Carbon Company

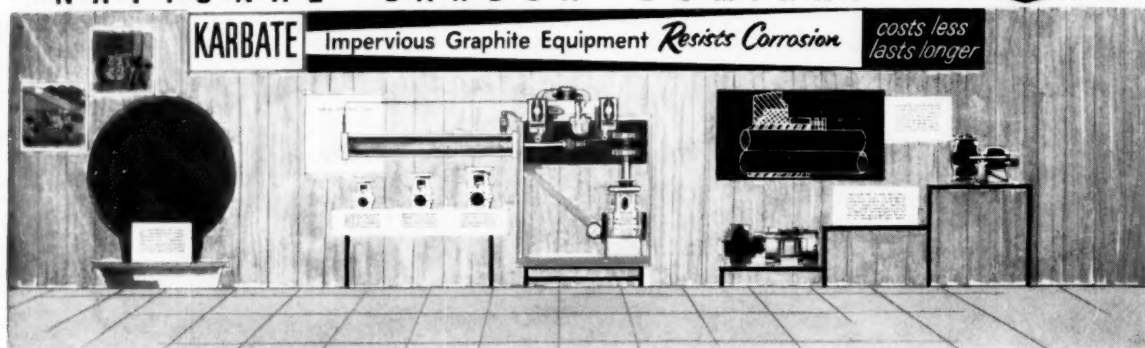
Division of Union Carbide Corporation • 30 East 42nd Street, New York 17, N. Y.

Sales Offices: Birmingham, Chicago, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. IN CANADA: Union Carbide Canada Limited, Toronto

## "CHEM SHOW" EXHIBIT SHOWS HOW "KARBATE" IMPERVIOUS GRAPHITE EQUIPMENT CUTS COSTS IN HANDLING CORROSIVES

NATIONAL CARBON COMPANY

DIVISION OF UNION CARBIDE CORPORATION

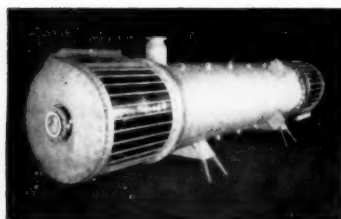


**NATIONAL CARBON COMPANY  
BOOTH #490,  
at the 1959 Chemical  
Industries Exposition  
N. Y. COLISEUM,  
NOV. 30th - DEC. 4th**

This year at the New York Coliseum you can see and talk about NATIONAL CARBON'S full line of "Karbate" impervious graphite process equipment.

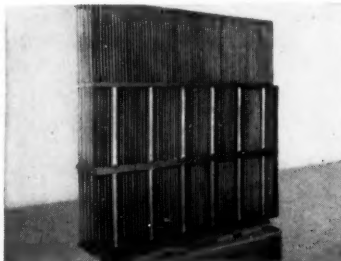
Learn the latest facts about "Karbate" equipment performance in process services such as: *heat exchange, pumping, fluid conveying,*

*and entrainment separating.* No other material can match the combination of *corrosion resistance, long life and low cost* you get with "Karbate" impervious graphite. Standardized designs assure fast delivery to speed plant conversion, replacement and expansion.



**"KARBATE" HEAT EXCHANGERS  
PROVIDE MAXIMUM ECONOMY**

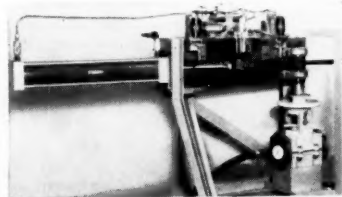
Planned replacement of metal heat exchangers in corrosive applications may cost more than using "Karbate" exchangers. "Karbate" impervious graphite shell and tube exchangers of standardized design are available with areas of from 17.7 to 3585 sq. ft. Prices range from \$7.85 to \$24.00 per sq. ft. See a 45" diameter cross-section of a typical exchanger at this year's exhibit in the *Chemical Industries Exposition*.



**NEW MODULAR TYPE ENTRAINMENT  
SEPARATOR FOR LARGE INSTALLATIONS**

The modular, Type MV, entrainment separator illustrated above is built from 1 by 2 ft. modules, which are easily assembled into banks to fit any duct or process vessel. "Karbate" separators are practically clog proof and are simple to clean when necessary. They operate with low pressure drops.

If you want to solve an entrainment pollution problem or recover a product from corrosive gas streams, see and ask about typical module installations at the Chemical Industries Exposition.



**NEW "KARBATE" GLOBE VALVE**

The "Karbate" Type G globe valve shown above undergoing life tests operates with low maintenance while handling corrosive solutions. This year's Chemical Industries Exhibit will show a "Karbate" valve being tested to prove its rugged dependability.



"National", "Karbate", "N" and Shield Device and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

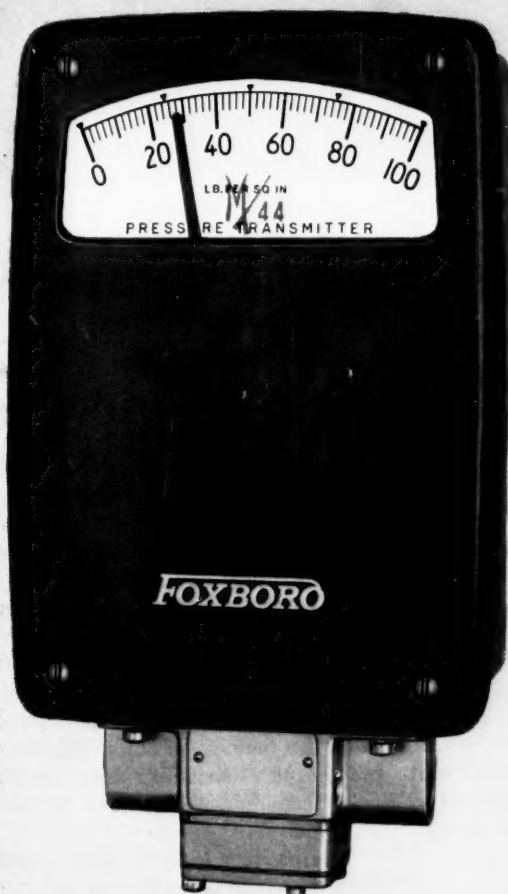




read pressure up to 20 ft. away!



## on the **FOXBORO** **M/44 INDICATING** **PRESSURE** **TRANSMITTER**



You can check pressure readings at a glance on the Foxboro Pneumatic Indicating Pressure Transmitter. Its open-face, horizontal, 4-inch indicator scale and eye-catching red pointer are clearly visible as far away as 20 feet.

But high readability is just part of the story. Actually, this instrument was engineered from the ground up. Makeshift arrangements have been eliminated, hung-on gauges are gone. Everything is included in one compact (5 $\frac{3}{4}$ " x 8 $\frac{1}{8}$ " ), ready-to-install instrument that weighs only eight pounds.

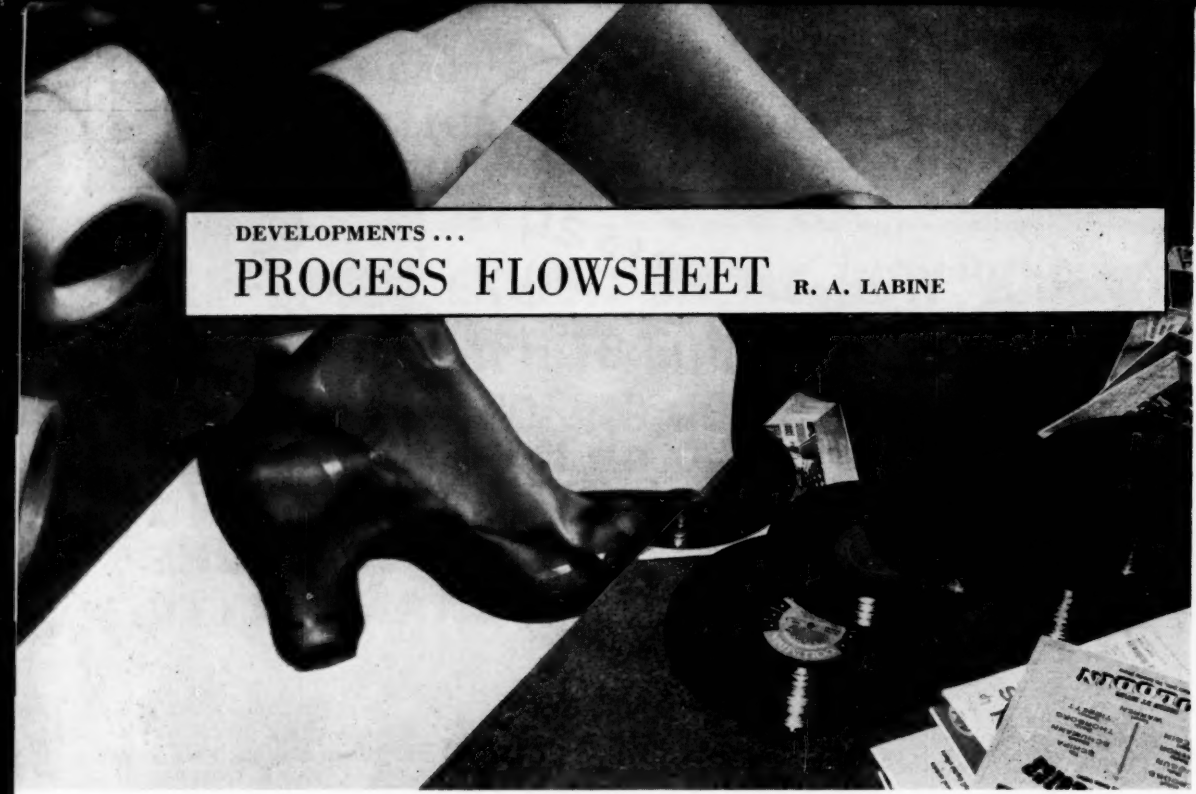
Because the indicating pointer is direct-connected to element and transmitter, calibration is easy . . . and you can re-zero the transmitter externally. All M/44 components are standard, performance-proved Foxboro parts. This makes it easier to stock and service.

A wide selection of interchangeable Foxboro pressure measuring elements gives the M/44 range limits of 0-30" water to 0-6000 psi. Elevated ranges are available, too.

Write for complete details. The Foxboro Company, 3611 Neponset Ave., Foxboro, Mass.

**FOXBORO**  
REG. U.S. PAT. OFF.

**INSTRUMENTATION FOR INDUSTRY**



DEVELOPMENTS ...

## PROCESS FLOWSHEET

R. A. LABINE

For a wide variety of PVC plastic products . . .

# Drying Tricks Tailor Resin Properties

Polyvinyl chloride is currently being produced at an 800-million-lb./yr. clip in this country, close behind the volume king—polyethylene. Of the score of PVC production facilities, one of the largest and most modern is Firestone Plastics Co.'s big plant in Pottstown, Pa.

Outstanding feature of this facility is the flexible drying setup which turns out a wide variety of resins. Various combination of drying units tailor resins from the low molecular weight material used in flooring to the high molecular weight plastisol resins used in resilient molded products (see table).

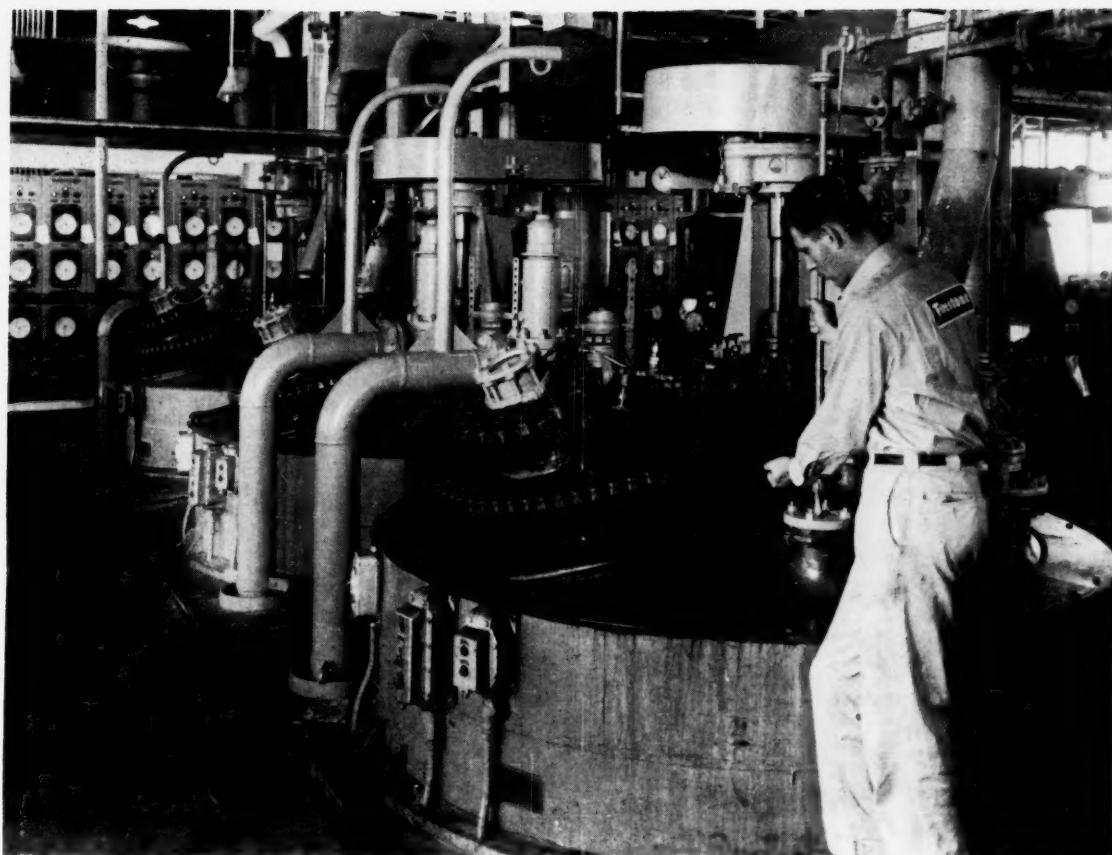
Firestone's processing sequence is the result of years of work with PVC. Firestone engineers built the latest addition to the reactor section and have just finished supervising an expansion of the drying facilities.

► **Drying Tailors Resins**—After carefully controlled reaction to regulate molecular weight, polymerized vinyl chloride suspended in water from the reactor section is held in an underground blend tank where uniformity checks are run. From this tank, PVC slurry flows to the various drying systems.

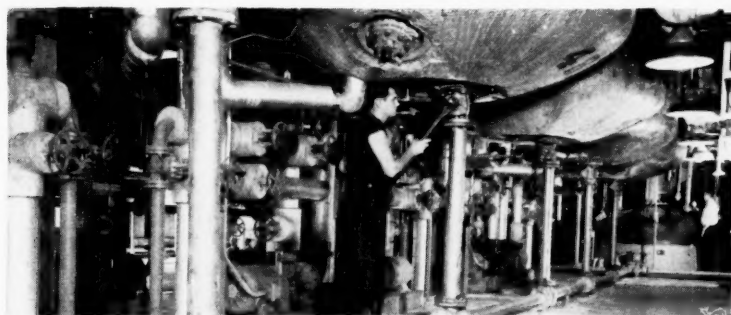
If product is to be spray dried, slurry passes directly to the spray drying cone without dewatering. Spray drying cyclone is three stories high and 18 ft. dia. at the top. Dried resin from the base of the cone passes through a grinder to be reduced to less than 325 mesh and then is packaged.

Drying Method	Drying Temperature	Particle Size
Spray drying	250 F.	< 325 mesh
Rotary	275 F.	140 mesh
2-Stage flash	300 F.; 275 F.	100 mesh
Flash-rotary	300 F.; 250 F.	200 mesh

Unfold Flowsheet →



REACTORS vary polymer size by varying reaction time and temperature. Drying then determines resin particle size.

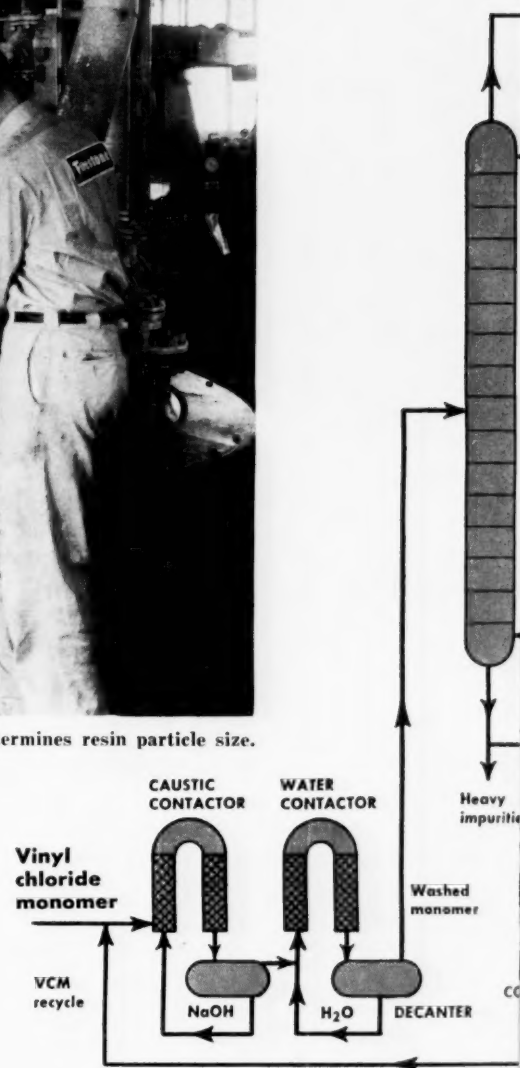


STRIPPING TANKS flash off the unreacted monomer from reaction mixture.

If resin is not to be spray dried, water content is reduced to 25% in a solid-bowl centrifuge. Then there are two possibilities: dewatered resin can flow to the 50-ft.-long, 8-ft.-dia. rotary dryer or it can be injected into the flash drying system. If resin is rotary dried, then it is screened and bagged after leaving the dryer.

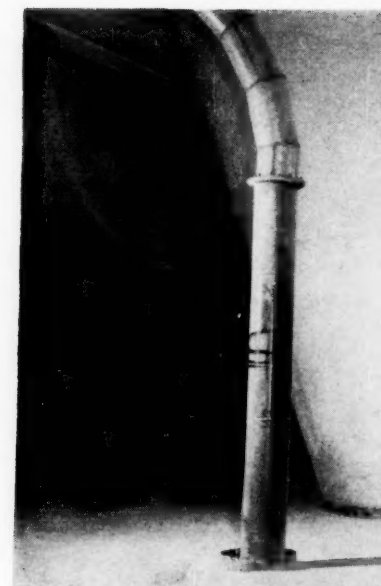
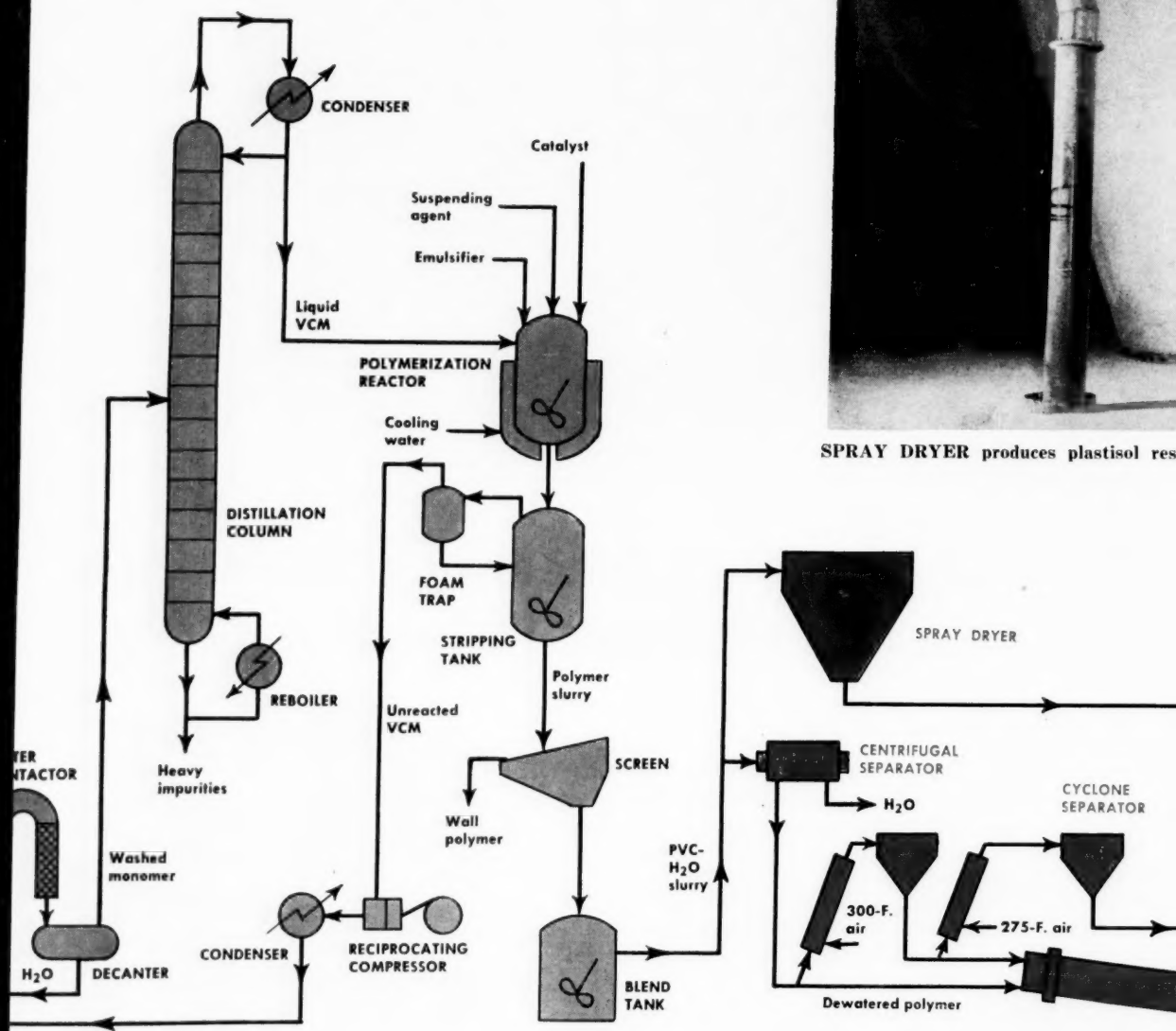
► **Combination System**—In the flash drying system, dewatered resin is injected into a 30-in. duct where it contacts 300-F. air. Partially dried resin (8-10%  $H_2O$ ) separates from the air in a 9 ft.-dia. cyclone separator.

Material from the bottom of the first cyclone can then be air-conveyed to a rotary dryer or can



pass through a final stage of flash drying, which cuts water content separating from the into a separator before packaging.

► **To Make a Polymer** (VCM) arrives at the phenol inhibitor to shipping. This inhibitor with aqueous sodium



SPRAY DRYER produces plastisol resin

pass through a hammer mill and flow to a second stage of flash drying. There it contacts 275-F. air which cuts water content to less than 1%. After separating from the air in a cyclone, resin drops into a separator which classifies the material before packaging.

► **To Make a Polymer**—Vinyl chloride monomer (VCM) arrives at the plant containing 100 ppm. phenol inhibitor to prevent polymerization during shipping. This inhibitor is removed by scrubbing with aqueous sodium hydroxide in Raschig-ring-

packed pipe scrubbers. After distillation in a 15-ft. plate column to remove any heavy impurities (from recycle or makeup VCM), liquid monomer is stored in a refrigerated tank at less than 60 F. and 50 psig.\* Once this purification has been carried out, VCM is handled only in stainless steel or glass-lined equipment.

For the polymerization step, VCM is weighed and charged to a glass-lined, 3,750-gal. batch reactor along with a suspending agent and suit-

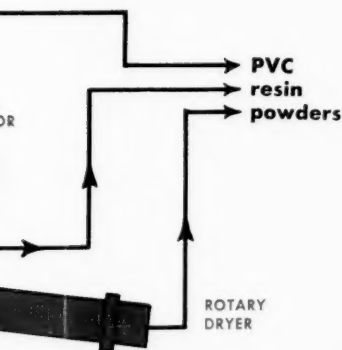
\*VCM boils at 7 F. at atmospheric pressure.

able ca  
for sus  
are us  
peratur  
psig. w  
► Resc  
water  
lined s  
batches  
as a va  
for 45



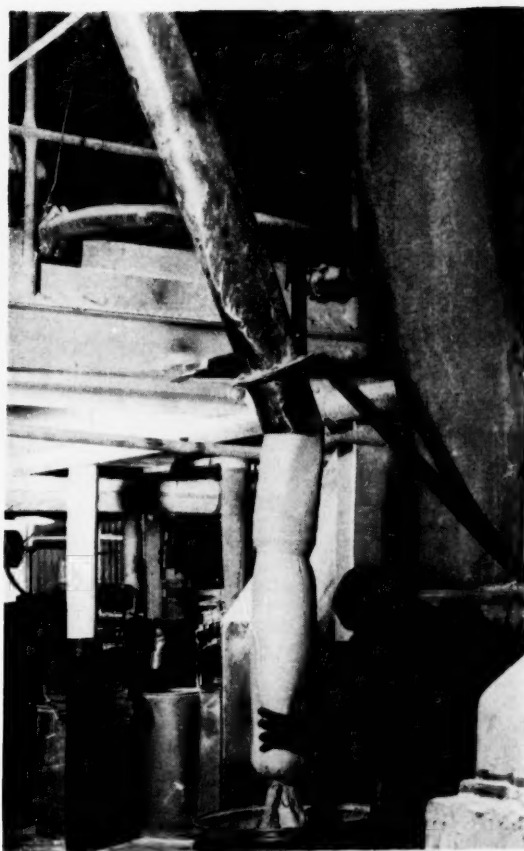


l resins, which come out like very fine, white flour.

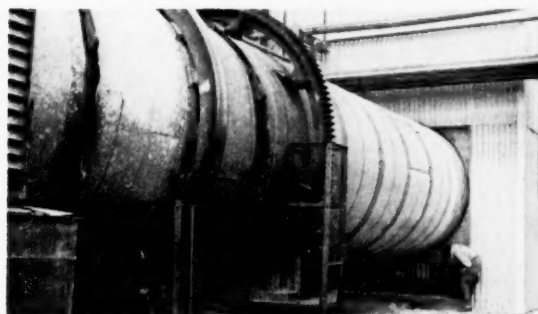


le catalyst. Organic peroxide catalysts are used  
r suspension polymers while  $H_2O_2$  or persulfates  
e used for emulsion-polymerized resins. Tem-  
peratures vary from 100 F. to 160 F. at 80-180  
ig. with time ranging from 12 to 18 hr.

**Rescuing the Monomer**—Reacted polymer in the  
water medium drops from the reactor to a glassed-  
stripping tank which can hold three reactor  
atches. A reciprocating compressor (operating  
a vacuum pump) maintains a 27-28 in. vacuum  
r 45 min. to 3 hr. Unreacted vinyl chloride



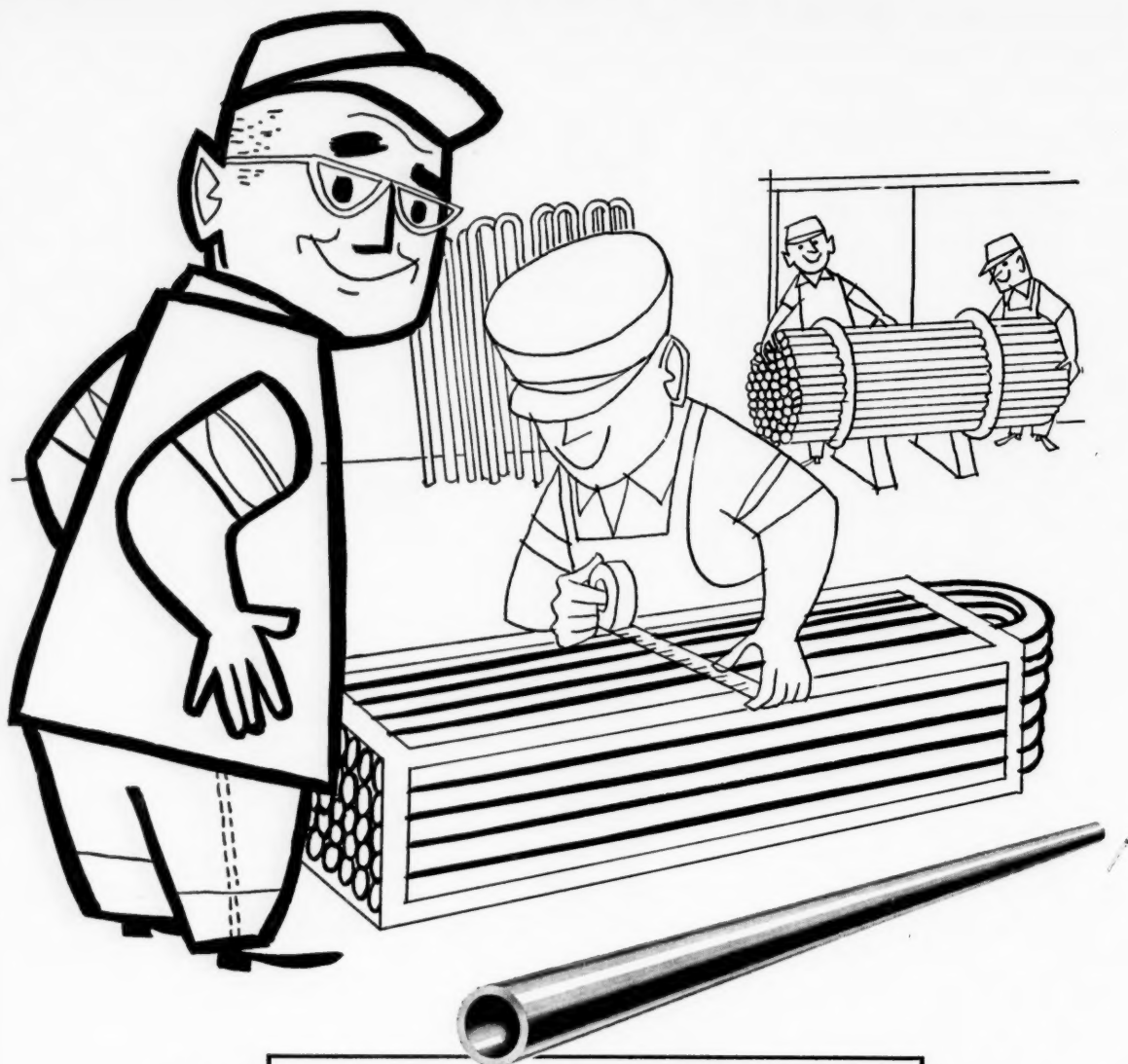
FLASH DRYER (right) produces porous, absorptive resins.



ROTARY DRYER produces a 140-mesh suspension resin.

vaporizes from the mixture, is compressed to  
80 psig. and is recycled.

From the stripping tank, PVC-water slurry  
passes through a vibrating screen that removes  
any wall polymer (large resin chunks). Slurry  
then flows to underground blend tanks for final  
quality checks before drying.



## How **B&W JOB-MATCHED TUBES** provide long service life in stainless steel

When you specify B&W Stainless Heat-Exchanger Tubes—either seamless or welded—you can count on:

- ... a complete range of stainless grades to meet any set of service conditions
- ... a wide variety of diameter and wall thickness combinations for all types of operating requirements

... fully annealed tubes for maximum resistance to corrosion

These are just a few of the reasons it pays to specify B&W Job-Matched Stainless Steel Heat-Exchanger Tubes. Call your local B&W District Sales Specialist, or write for Bulletin TB-329 for full information. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

CHEMICAL SHOW • Booth 1002  
Coliseum • New York  
November 30–December 4

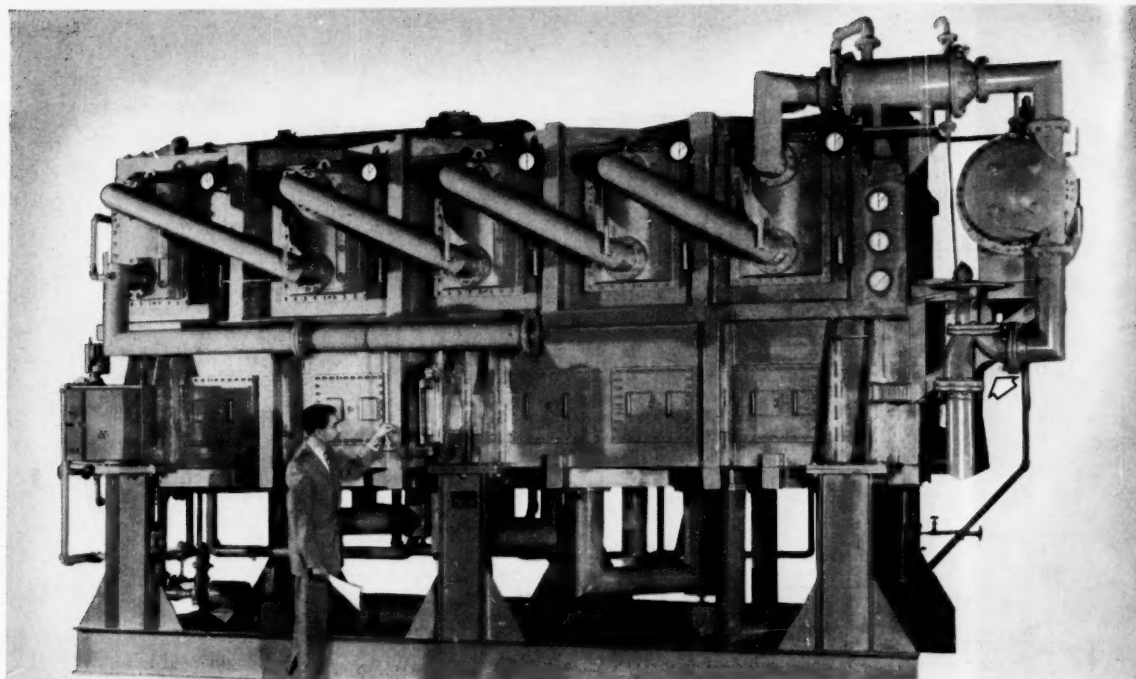


# B&W

THE BABCOCK & WILCOX COMPANY  
**TUBULAR PRODUCTS DIVISION**

TA-9019-S3

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals



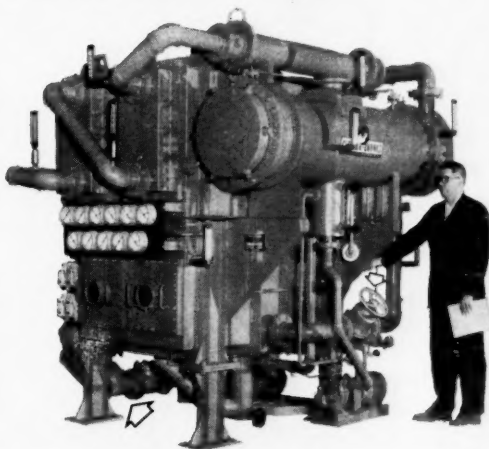
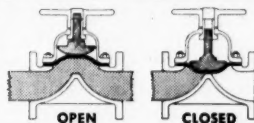
**ON LAND** At Salinas, a tourist center in Ecuador, this Cleaver-Brooks Flash Evaporator delivers 50,000 gallons of pure, distilled water every 24 hours. It is equipped with two 6", rubber lined, weir-type Grinnell-Saunders Diaphragm Valves — only one of which can be seen from this view.

## Grinnell-Saunders Diaphragm Valves help convert salt water to fresh water

You can convert sea water to fresh water, in abundant supply, on land . . . or on shipboard, with flash evaporators made by Cleaver-Brooks Special Products, Inc., Waukesha, Wisconsin. Grinnell-Saunders Diaphragm Valves are used as original equipment on these distillation units because they offer positive, leak-tight closure; flow control in throttling position; corrosion-resistance.

You'll find Grinnell-Saunders valves widely used in other fields, too . . . petroleum, papermaking, chemical, food, compressed air . . . to mention a few.

The operating principle of the Grinnell valve is the feature which makes it so adaptable. The diaphragm lifts high for streamline flow in either direction; seals tight for positive closure against grit, scale, solid matter, pressure or vacuum. Bonnet mechanism is completely isolated at all times from the fluid in the line by the diaphragm, preventing corrosion and contamination. Smooth passage, without pockets, eliminates trapping of solids and reduces frictional resistance. And you can get body, lining and diaphragm materials to meet your particular service conditions. Get *all* the facts. Write Grinnell Company, Providence 1, R. I.



**AT SEA** The nuclear powered NS Savannah has two 16,000 gallons-per-day Cleaver-Brooks distillation units to supply the entire water requirements of crew and machinery. Each unit has two 4" Grinnell-Saunders Straightway Valves of ductile iron.

See us at the Show — Booth 566

# GRINNELL



Pipe, Fittings, Valves, Hangers, Heating and Piping Supplies  
Branch Warehouses and Distributors From Coast To Coast

# See the NEW Raymond



## FLUID BED DRYER UNIT

ON EXHIBIT IN  
**BOOTH 646**  
CHEMICAL SHOW

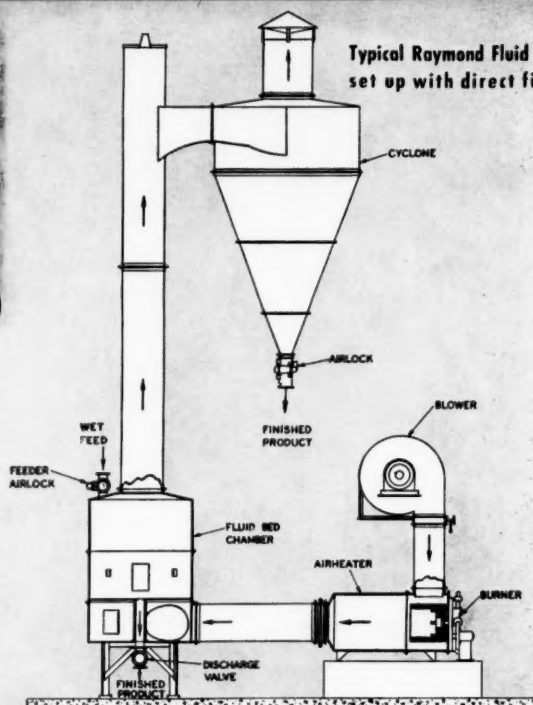
Nov. 30—Dec. 4  
NEW YORK COLISEUM

A working model of the Raymond Fluid Bed Dryer in clear plastic construction will be featured at the Chemical Show.

Also a working model of Flash Drying System . . . an actual 18" Vertical Mill specially adapted for pulverizing solid rocket oxidizers . . . and a Mechanical Air Separator.

### PRINCIPAL ADVANTAGES

1. High thermal efficiency
2. Small space requirements
3. Absolute minimum of moving parts (none in high temperature zone) helps to reduce maintenance
4. Gentle handling gives minimum degradation
5. Permits some degree of particle size classification
6. Accurate control of final  $H_2O$
7. Continuous, automatic, dust-free operation.



Raymond started development work on the Fluid Bed type of dryer in 1950 as a complement to the well known line of Flash Drying Systems.

This broadened the range of dryers for handling problems where a very minimum of crystal breakage is required, as well as in processes where appreciable retention time is desired.

The first commercial size Raymond Fluid Bed Dryer was installed in 1953 on a problem requiring minimum crystal breakage. Since then, additional units have been installed by themselves or in conjunction with Flash Drying Systems.

Salt, gilsonite, synthetic resins and organic crystals are being handled in these units. Successful test work has been conducted on a variety of other materials.

With the broadened line of drying units now available, it is even more important to consult Raymond engineers when your drying problems come up. A Raymond Fluid Bed or a Flash Dryer could well be the best solution to your problem.

**COMBUSTION ENGINEERING, INC.**  
*Raymond Division*  
1112 W. BLACKHAWK ST.  
CHICAGO 22, ILLINOIS

Combustion Engineering-Superheater Ltd., Montreal, Canada

SALES OFFICES IN  
PRINCIPAL CITIES



## How Foster Wheeler gives you "profits" from chemicals you don't make

It's a matter of getting full value out of ideas . . . because ideas that start with one chemical product or process can often make another *different* product or process better, or more profitable.

Today, for instance, one producer of *methanol* is enjoying benefits of "profit ideas" based on FW's experience in combining methanol and ammonia synthesis. Another example, FW's design for production of high quality phthalic anhydride makes possible new profit-making efficiency for plants with capacities of three tons per day or more.

Find out about these and many other "profit ideas" FW can offer, by writing to Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, N.Y. Ask for the new booklet about "The Plant You Want to Build".

*Heat Engineered* products, plants and processes . . . for the world's industrial progress.

**FOSTER**  **WHEELER**  
NEW YORK LONDON PARIS ST. CATHARINES, ONT.



—petroleum processing



—chemical processing



—specialized installations



# Need Maintenance Steels?



## 5 Reasons why it pays to buy from Ryerson

**MOST DIVERSIFIED STOCKS**—Ryerson inventories include by far the widest range of types, shapes and sizes available anywhere.

**FAST SERVICE**—A combination of varied stocks, modern equipment and an experienced staff means stepped-up processing for *regular requirements* and unparalleled ability to meet the most urgent *emergency needs*.

**HIGHEST QUALITY**—New quality-control standards, completely detailed and published, govern every aspect of Ryerson specifications and operations. Here is steel that's *certified* for dependable

performance, and cut to your most *exacting* requirements.

**TECHNICAL HELP**—Experienced specialists, well qualified to work with you on problems of replacement and selection, help you achieve optimum value for your steel-buying dollar.

**INTEGRITY**—The nationally recognized leader in its field, Ryerson values your patronage much too highly to sacrifice your long-term good will for any immediate gain. 117 years of fair dealing—at your service.

### LET RYERSON CARRY YOUR INVENTORY

— Whatever your maintenance steel needs, you get one-call, one-order delivery at Ryerson. Order today.



**I.V.B.M.**

Increased Value in Buying Metals

Ask about this Ryerson Plan for 1959

INDUSTRIAL PLASTICS AND BEARINGS DIVISION



**RYERSON STEEL®**

Joseph T. Ryerson & Son, Inc., Member of the  Steel Family

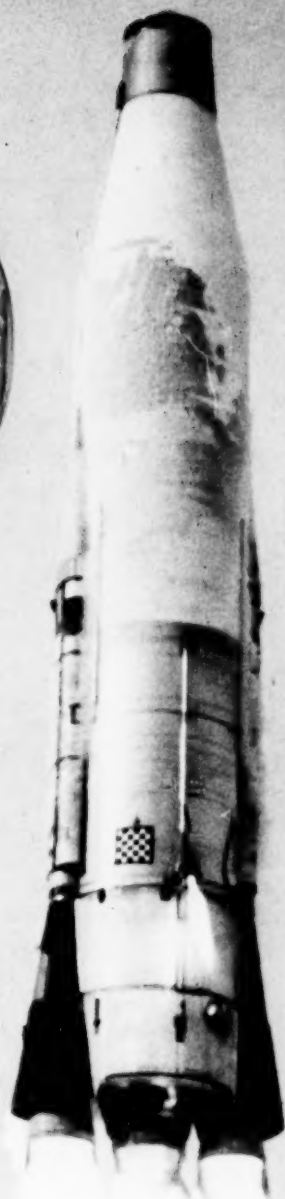
STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

NATION'S MOST COMPLETE SERVICE CENTERS IN PRINCIPAL CITIES COAST TO COAST



# Partners in Man's Progress

IN THIS ANNIVERSARY YEAR of its first century, the petroleum industry has reason to be proud of many contributions to mankind. Much of what we call the industrial revolution has been powered by the energy of its products. Most of man's needs for mobility — civil and military transportation — are fueled with petroleum. And all these achievements would scarcely have been possible without the parallel growth and resourcefulness of American chemical engineers. To-



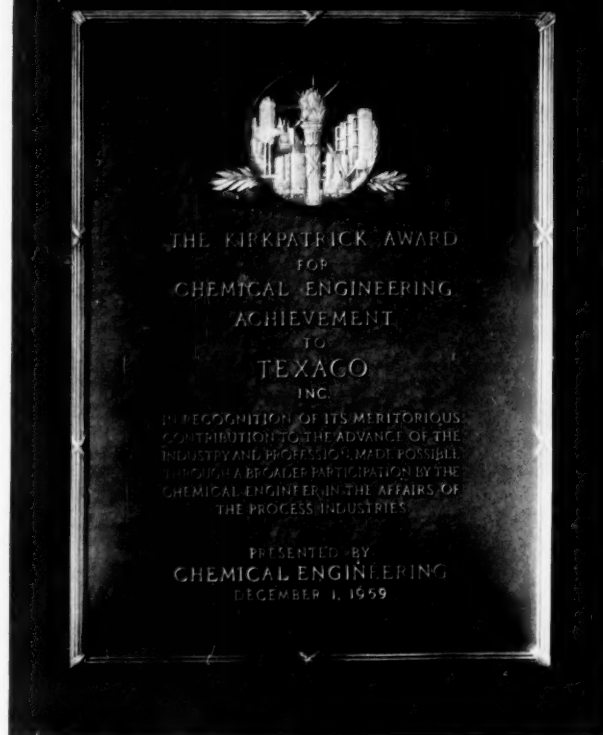
**CHEMICAL ENGINEERING • NOVEMBER 16, 1959**

gether, the industry and profession build for the future.

Simplest of all the chemical building blocks in petroleum's rich storehouse is hydrogen. Its increasing availability in ever higher volume and purity at ever lower cost has long been sought. Cheaper, purer hydrogen for ammonia synthesis plays a critical role in increasing the world's supply of food. Its applications in chemical and metallurgical processes give rise to greater yields of better products at lower costs. Its most dramatic role, just now unfolding, will be as liquid fuel to propel rockets and missiles, perhaps to provide the power to thrust man into outer space.

So it is with an eye to the future, as well as to past accomplishments, that the 1959 Committee of Award for Chemical Engineering Achievement honors the organization responsible for the Texaco partial oxidation process for the generation of synthesis gas — hydrogen and carbon monoxide. Here, in the recorded vote of ninety-four eminent educators, was an outstanding example of "the successful, large-scale commercial development of a process — based on research and actively developed, designed and operated by chemical engineers."

That Texaco should succeed where others had failed is eloquent testimony to the technical competence and resourcefulness of its chemical engineers. But it also reflects a long-standing tradition of management-chemical engineering teamwork that has provided proper climate and facilities for successful group effort. The work of hundreds of chemical engineers in every phase of operation — from fundamental research to profitable reduction to practice — called for expenditures in the millions. But today it is paying off in contributions to man's well-being in almost two score of plants in more than a dozen countries throughout the world.



Texaco Inc. has long recognized the fact that the professional services of chemical engineers are essential to its continued growth and progress. It shared in the 1943 group award for chemical engineering's great wartime achievement — the successful development of the American synthetic rubber industry. And it is most appropriate now that it should again be recognized for its continuing contributions to mankind that have resulted from a fruitful partnership of industry and profession.

Respectfully submitted,

P.S. Returning from a long pre-retirement vacation, I was surprised and embarrassed, but mighty proud, to learn that during my absence the McGraw-Hill sponsors of this award had decided to name it and succeeding awards in my honor. My debt is great to them and to Chairman Whitman and his loyal committee, now numbering almost a hundred senior educators, who have cooperated so whole-heartedly in our group effort to serve the chemical engineering profession. — Sid

# 1959

## COMMITTEE OF AWARD

---

**WALTER G. WHITMAN**, Massachusetts Institute of Technology, *Chairman*

**SIDNEY D. KIRKPATRICK**, McGraw-Hill Publishing Company, Inc., *Vice Chairman*

**CECIL H. CHILTON**, Editor, "Chemical Engineering", *Secretary*

**W. W. AKERS**, The Rice Institute  
**E. H. AMICK, JR.**, Columbia University  
**N. R. AMUNDSON**, University of Minnesota  
**F. A. ANDERSON**, University of Mississippi  
**R. V. ANDREWS**, Lamar State College of Technology  
**G. T. AUSTIN**, State College of Washington  
**R. V. BAILEY**, Tulane University  
**B. L. BAKER**, University of South Carolina  
**C. P. BAKER**, Northeastern University  
**M. E. BARKER**, University of Arkansas  
**C. A. BASORE**, Alabama Polytechnic Institute  
**W. H. BEISLER**, University of Florida  
**LLOYD BERG**, Montana State College  
**G. H. BEYER**, University of Missouri  
**R. M. BOARTS**, University of Tennessee  
**F. W. BULL**, Virginia Polytechnic Institute  
**A. P. BUTHOD**, The University of Tulsa  
**F. L. CARNAHAN**, Pennsylvania State University  
**W. W. CHEW**, Louisiana Polytechnic Institute  
**E. B. CHRISTIANSEN**, University of Utah  
**JESSE COATES**, Louisiana State University  
**A. M. COOLEY**, University of North Dakota  
**L. S. COONLEY**, Rensselaer Polytechnic Institute  
**K. W. COONS**, University of Alabama  
**JAMES COULL**, University of Pittsburgh  
**J. T. CUMMING**, Fenn College  
**B. F. DODGE**, Yale University  
**H. G. DONNELLY**, Wayne State University  
**C. G. DUNCOMBE**, University of Detroit  
**F. A. FLETCHER**, Drexel Institute of Technology  
**A. S. FOUST**, Lehigh University  
**S. K. FRIEDLANDER**, The Johns Hopkins University  
**J. A. GERSTER**, University of Delaware  
**H. V. GRUBB**, Georgia Institute of Technology  
**C. F. GURNHAM**, Michigan State University  
**JOHN HAPPEL, JR.**, New York University  
**G. A. HAWKINS**, Purdue University  
**R. M. HUBBARD**, University of Virginia  
**W. J. HUFF**, University of Maryland  
**M. L. JACKSON**, University of Idaho  
**L. C. JENNESS**, University of Maine  
**E. F. JOHNSON**, Princeton University  
**KARL KAMMERMEYER**, State University of Iowa  
**D. L. KATZ**, University of Michigan  
**W. A. KOEHLER**, West Virginia University  
**J. H. KOFFOLT**, Ohio State University  
**W. L. KRANICH**, Worcester Polytechnic Institute

**W. N. LACEY**, California Institute of Technology  
**B. E. LAUER**, University of Colorado  
**WILLIAM LICHT**, University of Cincinnati  
**J. D. LINDSAY**, The Agricultural and Mechanical College of Texas  
**E. E. LINDSEY**, University of Massachusetts  
**E. E. LITKENHOUS**, Vanderbilt University  
**G. M. MACHWART**, Michigan College of Mining and Technology  
**R. N. MADDOX**, Oklahoma State University  
**J. O. MALONEY**, University of Kansas  
**C. L. MANTELL**, Newark College of Engineering  
**J. J. MCKETTA**, University of Texas  
**E. L. McMILLEN**, Lafayette College  
**S. A. MILLER**, University of Rochester  
**M. C. MOLSTAD**, University of Pennsylvania  
**C. C. MONRAD**, Carnegie Institute of Technology  
**R. A. MORGEN**, Rose Polytechnic Institute  
**R. W. MOULTON**, University of Washington  
**H. P. MUNGER**, Syracuse University  
**D. F. OTHMER**, Polytechnic Institute of Brooklyn  
**R. E. PECK**, Illinois Institute of Technology  
**M. S. PETERS**, University of Illinois  
**H. W. PRENGLE, JR.**, University of Houston  
**A. H. RADASCH**, The Cooper Union  
**R. A. RAGATZ**, University of Wisconsin  
**R. E. RICH**, University of Notre Dame  
**A. X. SCHMIDT**, The City College of New York  
**E. M. SCHOENBORN**, North Carolina State College  
**H. L. SHULMAN**, Clarkson College of Technology  
**H. D. SIMS**, Bucknell University  
**C. M. SLIEPCEVICH**, University of Oklahoma  
**J. M. SMITH**, Northwestern University  
**L. B. SMITH**, Tufts University  
**MORTON SMUTZ**, Iowa State College  
**R. G. STEVENS**, Southwestern Louisiana Institute  
**L. E. STOUT**, Washington University  
**C. M. THATCHER**, Pratt Institute  
**A. R. THOMPSON**, University of Rhode Island  
**DUDLEY THOMPSON**, Missouri School of Mines and Metallurgy  
**T. J. WALSH**, Case Institute of Technology  
**J. S. WALTON**, Oregon State College  
**H. T. WARD**, Kansas State University  
**J. H. WEBER**, University of Nebraska  
**R. E. WHITE**, Villanova University  
**C. R. WILKE**, University of California  
**G. C. WILLIAMS**, University of Louisville  
**C. C. WINDING**, Cornell University

---

*"The Committee of Award shall consist of the heads of chemical engineering in all of the educational institutions of the United States, whose courses have been accredited by the American Institute of Chemical Engineers and the Engineers' Council for Professional Development."*

# Hydrogen's Revolutionary Role

CHEMICAL PROCESS INDUSTRIES everywhere are in the midst of a quiet, persistent revolution. Hydrogen, simplest of the chemical elements, is gradually remaking much of the world's economy. In contrast to the H-bomb's noisy fanfare of fear and destruction, *process* hydrogen promises many immediate and lasting benefits for mankind.

Cheaper, purer hydrogen can now be made almost anywhere from almost any hydrocarbon — liquid, gaseous or solid. Nitrogen fertilizers so derived can greatly increase food production in areas that otherwise face a dark future of hunger. Hydrogenation processes underlie many basic operations in the organic chemical, plastics, petrochemical and petroleum industries. New techniques for hydrogen reduction of iron and other ores may eventually revolutionize the metallurgical industries, especially where there is a shortage of coal and coke.

Pending the day when the discovery of new oil reserves fails to keep pace with ever mounting demands or if the United States were isolated by war from its foreign crude oil supplies, our own future might well depend on a continuous supply of high purity hydrogen for the synthesis of fuels from natural gas, coal, shale oil, tar sands or other hydrocarbon sources. And, in its own dramatic role as a fuel, liquid hydrogen is just now being used experimentally, we are told by the U. S. Air Force, to propel missiles over tremendous distances and to provide the power that may yet thrust man into outer space.

American chemical engineers have made a significant and substantial contribution to this unfolding picture of progress in the production and application of process hydrogen. And the most noteworthy advances, in the opinion of the 1959 Committee of Award for Chemical Engineering

Achievement are those that have resulted from the long-time research and ultimate commercial development of the Texaco synthesis gas generation process.

For many years the mixture of hydrogen and carbon monoxide used for the synthesis of ammonia, methanol and other chemicals was produced almost exclusively from solid fuel by the well-known water-gas reaction. But that process was largely limited to areas where coke could be obtained at reasonable cost. Then long-distance pipe lines made natural gas more generally available and for a time it seemed that synthesis gas could be produced most economically by reacting methane with steam at temperatures near 1,500 deg. F. in the presence of a catalyst. Again, however, there were limitations imposed by these operating conditions that prevented the use of the high pressures demanded in subsequent processing. Natural gas was often available at very high pressures and since most hydrocarbon syntheses required synthesis gas at 300 to 500 psig., it was obviously desirable to avoid recompression if at all possible.

It was for these reasons that Texaco engineers undertook the development of a process for generating hydrogen and carbon monoxide at higher than synthesis pressures. There seemed to be no possibility of achieving this goal via any modification of the conventional catalytic steam-methane reaction.

## BACKGROUND OF METHANE-OXYGEN REACTION

For many years it had been known that methane could be converted to carbon monoxide and hydrogen by reaction with limited quantities of oxygen. In contrast with the endothermic steam-methane reaction, it offered the possibility of making synthesis gas without external heat. The

First synthetic ammonia plant to use Texaco gas generators is that of Spencer Chemical Company at Vicksburg, Mississippi. Here natural gas is preferred raw material but liquid hydrocarbons may readily be substituted by suitable modifications in its processing





process had been studied experimentally at atmospheric pressure in Germany and Italy in their search for synthetic fuels. But because of the limited supply of methane in Europe, its low-pressure oxidation was impractical for commercial use.

#### TEXACO'S NONCATALYTIC FLAME RESEARCH

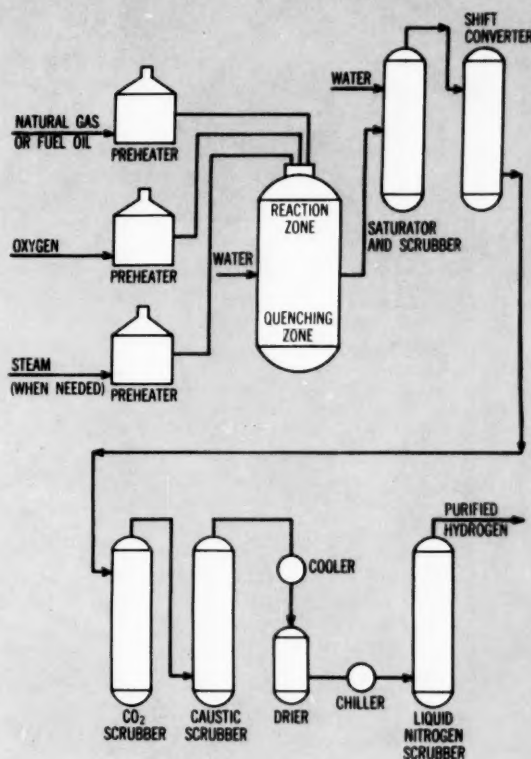
Having established its chemical engineering research center in the Montebello gas field in California, Texaco directed its first pilot plant toward the use of pre-mixing and packed reactors. The operating problems encountered with such an arrangement led to the investigation of other means.

Texaco's chemical engineers had had considerable experience with pressure combustion for other purposes. They conceived the oxygen-methane reaction as a non-catalytic controlled flame phenomenon that might be carried out with a burner which would accomplish very rapid and complete mixing entirely within an unobstructed reaction zone. It was discovered that by unique design of the generator, burner and appurtenances, a catalyst as generally considered essential in order to obtain almost instantaneous equilibrium, is unnecessary in the partial oxidation of hydrocarbon fuels. The many practical and economic objections to the use of a catalyst were therefore obviated. Early in the work at Montebello, decision was accordingly reached to feed the separately pre-heated raw materials to a specially designed burner located at the top of an empty but properly proportioned reactor vessel.

There, ignition, mixing and reaction would take place almost simultaneously in the flame front. This had not been tried before because at the pressure and temperatures involved (400 psig. at temperatures above 2,000 deg. F) it was deemed too hazardous. However, the chemical engineers who were involved in this development had previous experience generating flue-gas with air at high pressures in other processing operations and were familiar with the instrumentation and construction materials required to protect against hazards involved in such highly exothermic processes.

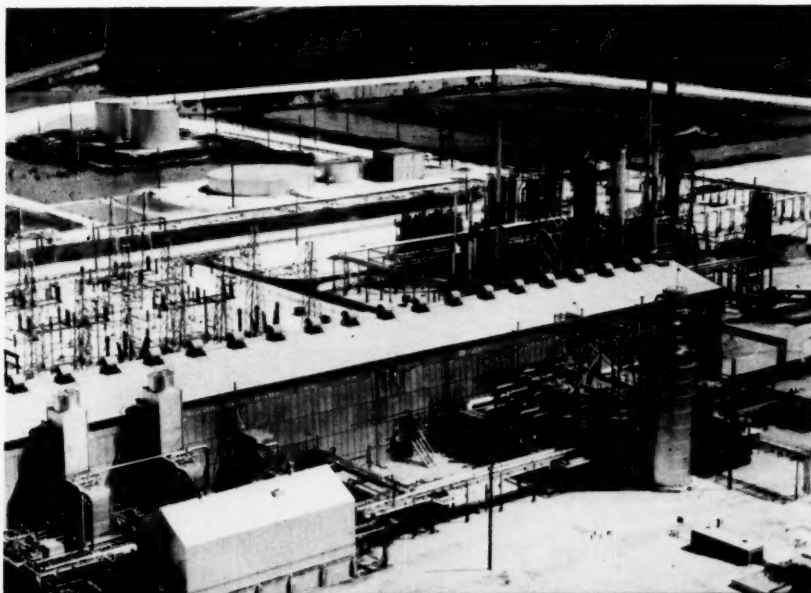
The principal hazard involved was the extremely high temperature that can result (of the order of 5,000 deg. F or higher) when hydrocarbon fuels are reacted with pure

#### TEXACO SYNTHESIS GAS GENERATION PROCESS



Simplified diagrammatic flow sheet for producing hydrogen from natural gas or fuel oil for ammonia synthesis

Air Force Plant 74 near West Palm Beach, Florida, is largest of three such installations and first to use Texaco process to make tonnage hydrogen for rocket and missile fuel from crude petroleum



## SYNTHESIS GAS RAW MATERIALS:

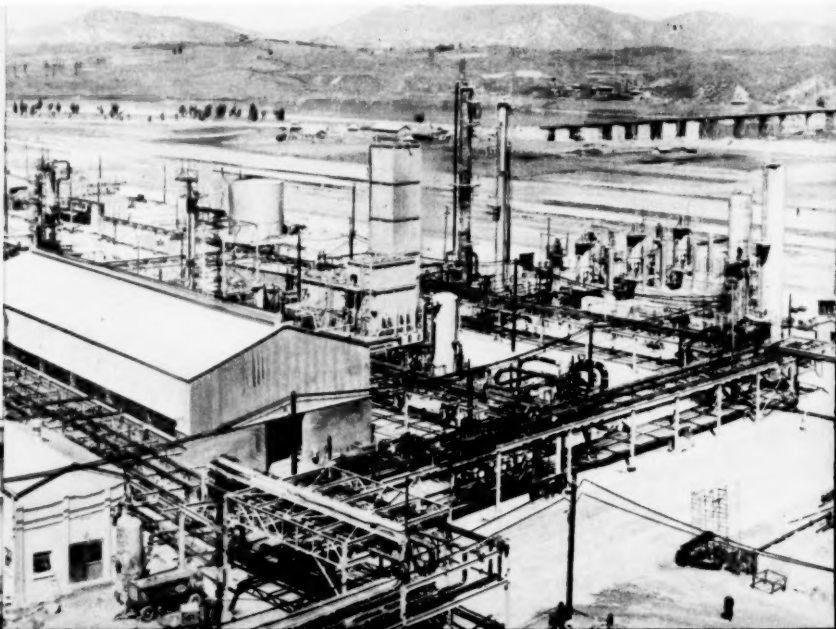
- **NATURAL GAS**  
United States/Italy  
Yugoslavia/Sicily
- **DIESEL FUEL**  
United States
- **HEAVY FUEL OIL**  
United States/Brazil/England  
Yugoslavia/Belgium/Sicily  
Canary Islands/Japan/Formosa  
Canada/Korea/France
- **CRUDE OIL**  
United States/Puerto Rico/Japan
- **REFINERY GAS**  
Brazil/Formosa  
Japan/Portugal
- **BY-PRODUCT GAS**  
France
- ▲ **LIGHT DISTILLATE**  
Portugal



## SYNTHESIS GAS END PRODUCTS:

- |                        |                      |                      |                      |
|------------------------|----------------------|----------------------|----------------------|
| Acryglass              | Aqua ammonia         | Fatty amides         | Nitric acid          |
| Acrylamide             | Bisamide             | Fatty amines         | Nitrocellulose       |
| Acrylonitrile          | Blasting caps        | Formamide            | Nitroglycerine       |
| Ammonia                | Calcium cyanide      | High purity hydrogen | Nitrophosphate       |
| Ammonium bicarbonate   | Caprolactam          | Hydrogen cyanide     | Nylon intermediates  |
| Ammonium chloride      | Celluloid            | Iron ore reduction   | OXO products         |
| Ammonium indosulfamate | Compound fertilizers | Lucite plastic       | Refined stearic acid |
| Ammonium nitrate       | Cuprammonium rayon   | Methanol             | Smokeless powder     |
| Ammonium sulfate       | Cyanuric chloride    | Methyl acrylate      | Soda fertilizer      |
| Ammonium sulfamate     | Cyclohexanol         | Methyl amine         | Manufactured gas     |
| Ammonium sulfite       | Dynamite             | Methyl methacrylate  | Urea                 |
| Anhydrous ammonia      | Ethylene glycol      | Methylol amide       |                      |

Etablissements Kuhlmann ammonia plant at Paimbœuf, France, uses Texaco synthesis gas generators and preheaters. (left). Urea fertilizer plant on the Han River, Republic of Korea, utilizes synthesis gas generation process in equipment shown at extreme right





oxygen. The products of excessive oxidation could result in local overheating which would destroy any equipment.

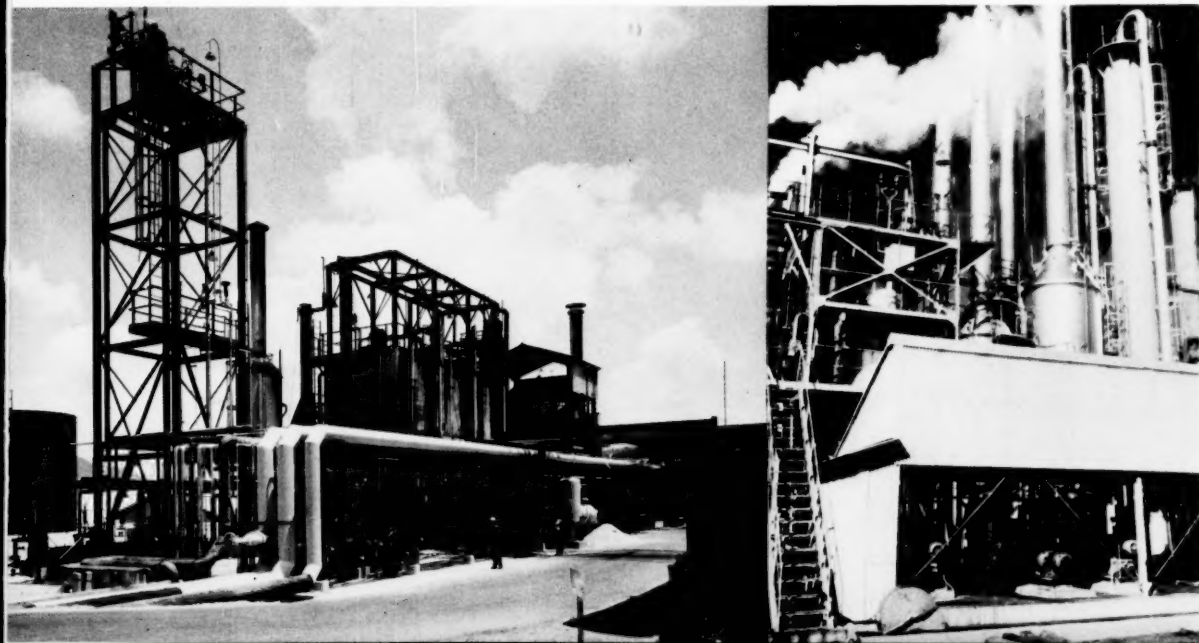
Design of both the burner and the reactor itself were critical factors in these early stages of the development of a successful gasification unit based on the noncatalytic flame reaction. Its operability was first demonstrated in a pilot unit built at Montebello. The generator operated in the neighborhood of 400 psig, with a capacity of 15,000 cu. ft./hr. or more of synthesis gas.

Once the technique for the production of carbon monoxide and hydrogen under high pressure had been perfected, it became apparent that this type of generator was not only useful for the production of gas for hydrocarbon synthesis, but that the gas could be subjected to the standard water-gas shift reaction to increase the proportion of hydrogen. Thus, it could play an important role in other hydrogen-consuming processes that were soon to prove more attractive commercially than the hydrogenation of carbon monoxide to make motor fuels.

Because of the urgent world need for fertilizers following World War II, an obvious opportunity for such a commercial application was in ammonia synthesis. Here too was a challenging research opportunity to adapt the synthesis gas generator to operation on cheap liquid fuels that could be made available at points remote from any supply of natural gas. Finally, having established operability on gases and liquid fuels, the next step was to extend it to solid fuels. Working with lignite, bituminous and anthracite coal, a new pulverization process was invented. This reduces solids to ultra fine particles of the order of one micron or less for suspension in a slurry feed for the synthesis gas generation. Thus the carbon cycle was completed for a truly flexible system of ammonia production anywhere from any hydrocarbon source.

This all-too-simple recitation of the history of development of the Texaco synthesis gas generation process fails to do justice to the wide range of chemical engineering principles involved and the numerous chemical engineering problems encountered and solved. Merely to list them by

Gonzalez Chemical Industries, Inc. employs Texaco synthesis gas generators in its fertilizer plant at Guanica, Puerto Rico. (left). Synthetic ammonia and chemical plant of Bofu Chemical Co., Ltd. at Ae-Mura Kako Gun, in Japan. Synthesis gas generator shown at left



category is like reading the contents page of a chemical engineering textbook.

First came the laboratory studies of reaction kinetics and equilibria for methane oxidation, the water-gas shift reaction and noncatalytic combustion. To find suitable materials of construction was the No. 1 problem in scale-up of equipment for such severe operating conditions of temperature, pressure and corrosion. The selection of reactor lining materials to provide the necessary combination of

thermal insulation and refractory properties was based on careful chemical engineering calculations and performance tests. The solution was a cylindrical carbon steel pressure vessel lined with successive layers of plastic insulation, insulating fire brick, first quality refractory fire brick and alumina brick. The relative quantities of these materials can be adjusted in such a way that each refractory layer is maintained at a safe working temperature while the metal wall temperature of the shell is held within safe working limits.

Another problem was to find the right material for the burner — a super-refractory that would not need water cooling under such severe conditions. There was, of course, no such metal available. Finally an alloy burner with a water-cooled tip was ingeniously designed and is operating satisfactorily under the extremely high temperatures of the reactor.

Subsequent chapters in the Texaco text book dealt with heat and mass transfer, fluid flow, scrubbing and absorption. Of almost overriding importance were the provisions for adequate instrumentation and control. Safe operations under every conceivable condition dictated ultra-sensitive temperature alarms, automatic shutdown devices to stop all feed flows if ratios departed more than a specified amount from the set values. The net result is reflected in a long history of safe operations in all parts of the world.

The accompanying map shows the location of the 37 plants in 15 countries that have been licensed by the Texaco Development Corporation to operate the synthesis gas generation process.

#### TEXACO AND CHEMICAL ENGINEERING

Texaco competes for leadership and profits in an industry noted for its intense rivalry in all aspects of technology. It has long recognized the fact that the professional services of the chemical engineer are essential to its continued growth and progress. Today approximately 500 chemical engineering graduates are widely diffused throughout the company and its subsidiary and affiliated companies. The range of their services can be deduced from the departments in which they work: Engineering, Producing, Refining, Transportation, Research and Technical, Sales, Petrochemicals and Foreign Operations. In their creative and consultative capacities to management they contribute to the success of every aspect of the company's operations and services.

Reference has already been made to the resourceful contributions and achievements of the group of chemical engineers in the Montebello, Calif., laboratory and pilot plants. More recently Texaco Inc. has completed a Fundamental Chemical Engineering Laboratory at Port Arthur, Tex. which will be concerned with basic studies of heat and mass transfer, vapor-liquid equilibria, and the application of pulsating flow or sonic energy to extraction processes.

Last year Texaco also completed the construction and operation of one of the largest and most versatile radiation laboratories in the petroleum industry. Another important aspect of its chemical engineering research will be found in the company's work in high-energy missile and aircraft fuels and advanced propulsion systems. A wholly-owned subsidiary, Experiment, Incorporated, developed and flight tested the first solid-fuel ramjet engine and pioneered in designing the first liquid propellant gun. It developed and operated the first molybdenum gas turbine and the mono-propellant ram and turbo-rocket engine powered by acetylenic fuels.

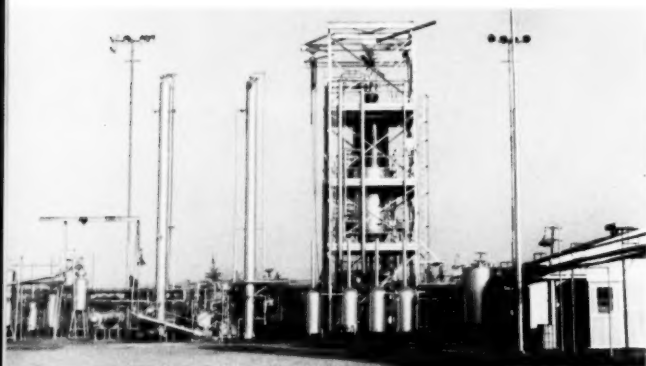
This then is the truly impressive record of the great resources and resourcefulness that won for Texaco Inc., the 1959 Award for Chemical Engineering Achievement.



Administration building in campus-like settings of Beacon, New York, center of Texaco Research and Technical Department



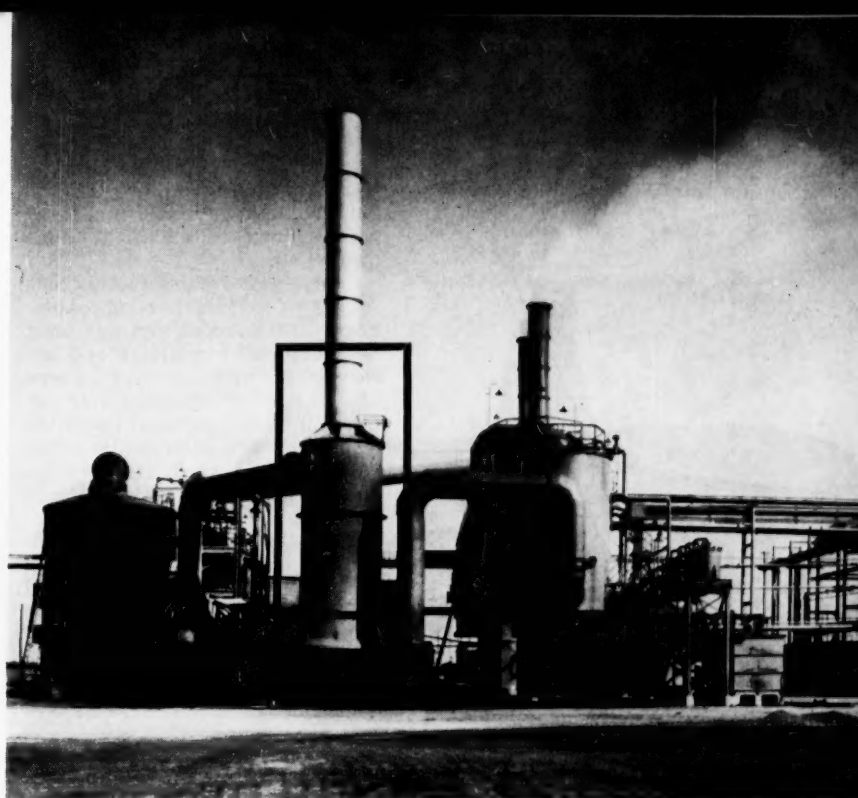
Here at this Montebello, California, laboratory Texaco chemical engineers developed the synthesis gas generation process



Pilot-plant equipment, such as this oil gasification generator at Montebello, is still in almost continuous use



No mist  
comes from this stack



Monsanto solves air pollution problems with . . .

## New Fiber Mist Eliminator

Crash program pays off in lower first cost, reduced maintenance, higher collection efficiencies with no increase in pressure drop.

**J. A. BRINK, JR.,** Supervisor, Engineering Development, Monsanto Chemical Co., St. Louis, Mo.

**A**IR pollution in the vicinity of chemical plants and refineries is becoming an increasingly serious problem to manufacturers and public alike. The best way to deal with the situation is to prevent the contaminants from entering the atmosphere in the first place. Effective implementation of this policy, however, is often dependent upon the nature of the contaminant. The remedy must fit the ailment.

Contaminants may take many forms. They may be pure gases, invisible but obnoxious. They may be dusts of fairly large particle size or smoke of very small particle size.

Often the pollutants are fogs or mists of liquid particles. Though such emissions may not be physically damaging, they are aesthetically offensive and often evidence of excessive material losses from the plant.

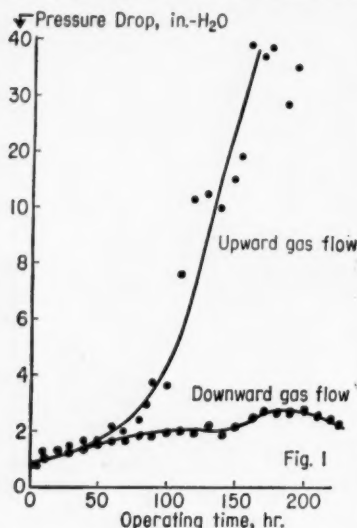
Many methods for dealing with the problem have been and are being developed and improved upon. Better process control and catalytic and chemical destruction of gaseous contaminants prevent the emission of noxious vapors to the atmosphere. Electrostatic precipitators, bag filters, dry cyclones and other types of equipment re-

move dust and smoke from effluent streams. Mist collectors and drying towers eliminate fogs and mists. Some of the applications for each of these methods, their relative advantages and disadvantages, were discussed in a previous issue. (See *Chem. Eng.*, Aug. 10, 1959, pp. 113-124.)

Dry fibrous filters consisting of beds of fibers or fiber mats have been used for many years for the collection of dust and other solids. Fiber mats of coarse (125 micron) glass fibers are widely used in the air-conditioning and ventilating field. However, these relatively



## Compare Upflow Versus Downflow



coarse filters will not remove fine smoke particles.

Theoretical and experimental work in recent years has shown that sub-micron aerosols can be collected with extremely high efficiencies on fibrous filters. Highly efficient fibrous filters developed for the removal of micro-organisms from air are used routinely in the fermentation industry for the sterilization of air.

Recent development of ceramic fibers has made possible dust filtration at temperatures in excess of 1,000 F.

In these various applications the fiber beds are usually plugged with solids after certain periods of operation and must be cleaned or thrown away. Thus the use of such filters is usually restricted to those applications where the dust loading is low.

General Electric Co. personnel at the Hanford Atomic Products Operation developed a glass fiber packed-bed type collector for the removal of radioactive particles from gas streams. The Hanford type unit was suitable for extremely low concentrations of particles (about 0.001 times the concentration leaving many chemical plant stacks,) and was a "throw-away" type unit designed to plug up after a certain period of time. Collection efficiencies as high as 99.99% were demon-

strated on sub-micron particles. Large scale units were found to be practical and economical at Hanford.

Commercial wet cell washers consisting of wetted beds of coarse fibers (150 microns and up) have been used as humidifiers and air cleaners for many years. This type of unit has the advantage over dry filters in that continuous operation on some dusts is possible. However, such coarse fiber beds are not effective for the removal of sub-micron particles.

Extensive evaluations of wet cell washers, made at the Harvard School of Public Health, showed that wet cells had low efficiencies on sub-micron particles but good efficiencies on larger particles. High efficiencies on sub-micron particles were obtained by the use of wet cell washers followed by dry pads of fine fibers.

Decreasing the fiber diameters in the wet cells resulted in improved efficiencies, but the finer fibers matted together when wet. For example, 10-micron glass wool fibers matted together and sagged away from their supports when wetted.

## New Approach Needed

Small liquid particles ranging in size from 0.1 to 3.0 microns must be collected in many chemical processes. Collection of such small particles is difficult and often requires the use of some very expensive equipment.

Research studies at Monsanto indicated that we would require new types of equipment for the economical solution of mist collection problems in the company. These studies also indicated that we might develop practical and economical fiber mist collectors. Such mist collectors would have to operate continuously to be economical and would have to be simple in construction and operation.

Since a pressing need for more economical mist collection equipment existed at one of our plants, a crash research program was carried out on mist collection with fiber beds. Simple laboratory experiments showed that liquid could be drained continuously from packed beds of glass fibers. These results indicated that a fiber bed might be operated continuously. Previous work showed that high efficiencies could be obtained.

## Continuous Fiber Mist Collectors

For continuous steady-state operation, glass fiber mist collectors must be designed and operated so that the liquid drains from the fibers at the same rate as it is collected. The collector must also be chemically and mechanically stable over a long period of operation.

Continuous liquid drainage from a fiber bed can be effected by the proper use of the forces of gravity. Frictional drag of the gases on the liquid film adhering to the fibers can also help to remove liquid. If the gases are passed downward through the fiber bed, continuous drainage is possible.

In one possible design of mist collector, the misty gas enters at the top and passes down through the fiber bed which is retained between two horizontal screens. The mist particles are collected as a film on the surface of the fibers while the cleaned gas leaves the unit at one side of the bottom. The liquid—moved downward by both the forces of gravity and the frictional drag of the gas on the liquid film—drains continuously from the unit.

Proper liquid drainage can also be obtained if the gas is passed horizontally through a bed retained by two vertical screens. Gravity tends to move the fluid to the bottom of the bed while the flowing gas tends to move it horizontally through the bed. When these two forces are of the same order of magnitude, the liquid moves downward through the bed at approximately 45 deg. Liquid at the downstream side of the bed drains down the screen and collects at the bottom where it is removed.

Steady-state continuous operation is possible with either of the designs discussed above. At constant gas flow and mist loading the pressure drop across each type of unit will remain constant as long as the fiber bed is mechanically and chemically stable. A new dry bed of fibers reaches steady-state operation within a few days of start-up. Initial pressure drop is about 50% of the steady state value. The pressure drop doubles when the fibers become coated with liquid.

If gas is passed upward through the bed, the frictional drag of the gas tends to hold up liquid in the bed in defiance of the downward pull of gravity. Such a bed, if made of very fine fibers, will tend to flood

when operated with upward gas flow.

### Mechanisms of Mist Collection

A number of theoretical and experimental studies on the mechanisms by which aerosols are collected by fiber beds have been made.<sup>1-6</sup> These studies indicate that aerosols are collected on dry fiber beds by inertial impaction, direct interception, Brownian diffusion and electrostatic forces. When fiber beds are completely wetted, collection should not take place electrostatically. Therefore, mist particles are collected by the first three mechanisms.

Let us consider a gas stream containing mist particles moving toward a fiber which is perpendicular to the direction of flow. The gas streamlines around the fiber. Particles larger than about 0.5 microns in diameter will not conform to the streamline flow and will touch the fiber in passing or will be directly intercepted by the fiber in its path.

Smaller particles, particularly those below about 0.3 microns in diameter, exhibit considerable Brownian movement and do not move uniformly along the gas streamline. These particles diffuse from the gas to the surface of the fiber and are collected.

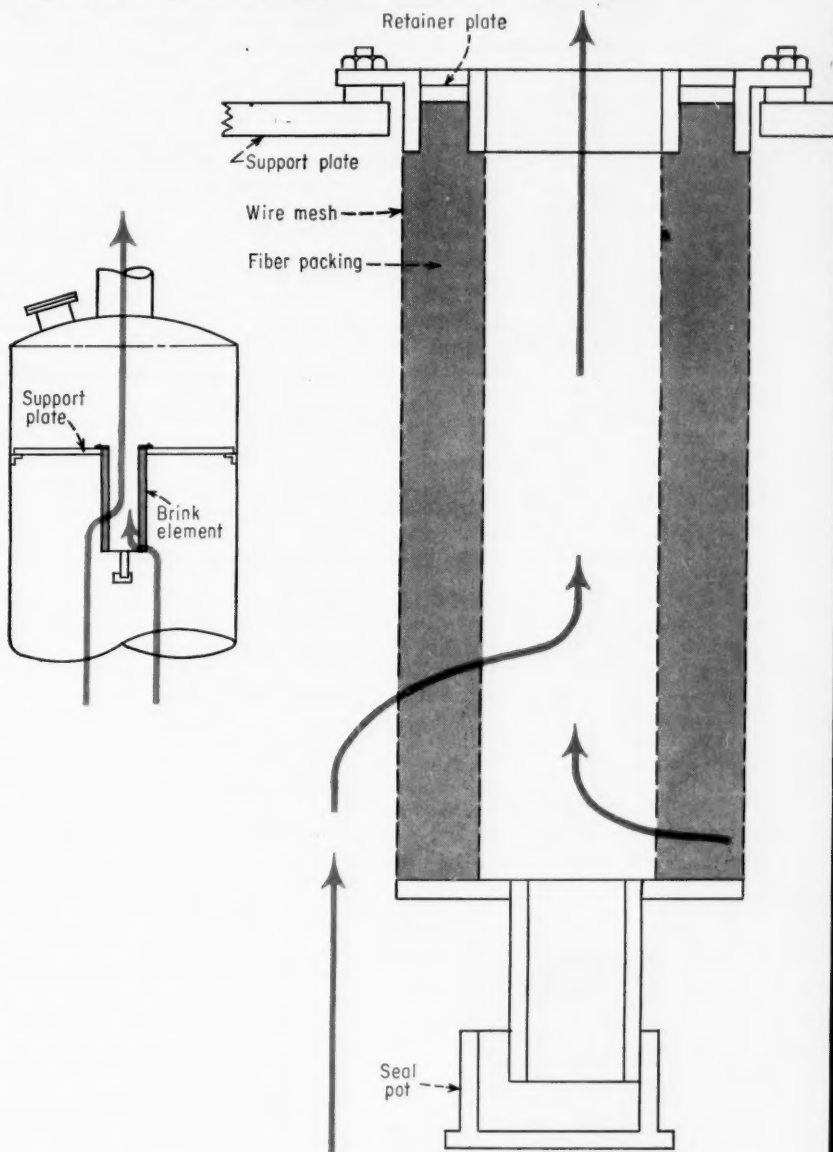
Particles may also be collected by direct interception. The particle may follow a gas streamline and be collected without inertial impaction or Brownian diffusion if the streamline is fairly close to the fiber. If a particle 1.0 micron in diameter follows a streamline which passes within 0.5 microns of the fiber, the particle will touch the fiber and will be collected.

Any mist particle passing through a fiber bed may be subjected to the combined effects of these three mechanisms. The mathematics of the various mechanisms, the combinations of the mechanisms and the complications of interference of each fiber with its neighboring fibers becomes quite complex. An excellent mathematical treatment based on the various mechanisms for aerosols has been done by Chen.<sup>1</sup>

### Crash Research Program

We at Monsanto realized that considerable research would be required before we could design a

### Fiber Mist Eliminator Easily Installed, Self Cleaning



practical and economical fiber mist collector. The dependent variables collection efficiency, pressure drop and fiber bed stability were important. We believed also that the following 9 independent variables might be significant:

- Direction of gas flow
- Gas velocity through fiber bed
- Depth of fiber packing
- Type of fiber, glass or plastic
- Fiber diameter

Mist particle size

Mist loading

Operating time

Packing density of fiber bed

Some of these independent variables might be dependent in some situations.

We estimated that a year or more would be required for the proper evaluation of these variables with a single experimental unit. Since a pressing need for more economical

mist collectors existed at one of our plants, a crash research program was planned.

Experimental equipment was designed so that six experiments at one time could be run. This equipment was then operated 24 hrs. a day, five days a week, on laboratory-generated  $\text{SO}_2$  and sulphuric acid mist. We varied all 9 of the independent variables mentioned previously. Thirty-seven different fiber test units were evaluated under different operating conditions. Three types of glass fibers and three synthetic fibers were investigated. We obtained collection efficiencies as high as 99.95% on 0.3 to 3.0 micron mist particles at steady-state operating conditions.

Determination of inlet and outlet particle size revealed an interesting fact. On a unit operating at a collection efficiency of 98.7%, the particle size distribution for the inlet and outlet streams was found to be the same.

Work was actually performed by pilot plant operators under the supervision of research personnel.

Our beliefs concerning fiber mist collector design were confirmed by the mass of data accumulated in these tests. Typical operating data are plotted in Fig. 1. Note the continuing increase in pressure drop as a function of time for the experiment conducted with upward gas flow. Compare this with the steady

pressure drop for the downward gas flow.

From these experiments evolved the mist collector element shown in Fig. 2. Not the least part of the efficiency of this design results from the use of the proper fiber in the element; few fibers were found to be suitable. Unfortunately, the identity and special treatment of the fiber which we found best suited and which we are now using in our full-scale installations cannot be revealed at this time.

### Some Case Histories

As mentioned, Monsanto began the intensive research in fiber mist eliminators to solve a problem at one of their own plants.

At one plant, a new installation, the stack plume was very persistent and visible for a considerable distance. The visibility was caused by 30 mg./SCF. of fine sulphuric acid mist particles and 80 to 200 mg./SCF. of phosphoric acid particles. To correct the situation, gas absorption apparatus followed by a fiber mist collector was installed in December 1958. The fiber mist collector has operated continuously since that time at a collection efficiency of 99% on particles below 3 microns in diameter and 100% on larger particles. There have been no maintenance problems or change in pressure drop through the apparatus since its installation.

The present stack plume, which consists of about 15% water vapor, disappears within 40 to 50 ft. of the stack on dry days and 150 ft. on wet days. We believe this is a remarkable achievement, particularly when the cost of the fiber system was a fraction of the cost of an electrostatic precipitator.

In another case, we had two electrostatic precipitators in service which were not doing the job. Further, maintenance costs on these units were excessive. This summer, the precipitators were torn down and replaced by a 20,000-SCFM. fiber mist collector. On an inlet loading of 1,100 mg.  $\text{P}_2\text{O}_5$ /SCF. (dry basis), the mist collector is delivering 99.98% efficiency on particles less than three microns and 100% on larger particles for an over-all efficiency of 99.998%. The exit stack loading is less than 0.02 mg./SCF. The stack gases leaving this unit are completely invisible—it is not possible to tell from the

appearance of the stack whether or not the unit is operating.

These are only two examples of industrial installations of the fiber mist eliminators developed in our crash program. Results with the full-scale units have met our expectations so well that we are rapidly going ahead with the installation of additional units wherever required. We now have 16 units on stream at various of our plants and expect to have another four on stream by the end of the year.

Capacities of these systems range from 3 SCFM to 20,000 SCFM; installed costs range from \$50 to \$50,000, considerably less than the cost of equivalent equipment. Mists and dusts successfully handled by the fiber mist collector are varied—sulphuric acid mist, oleum, phosphoric acid, ammonium chloride fume, air compressor oil, bacteria and various organics. Some of our installations must deal with several of these contaminants simultaneously.

Fiber mist collectors have improved our air pollution control while reducing our costs. First costs are lower and maintenance charges have been practically eliminated. The 20 units installed or about to be installed are by no means the last. Our future plans call for several more at Monsanto contact sulphuric acid plants and Leonard-Monsanto contact plants.

### ACKNOWLEDGMENTS

The author acknowledges with gratitude the assistance of those who have contributed to the design, construction and operation of experimental fiber collectors: W. M. Davis, D. A. Moore, B. Oster, M. H. Taylor, M. P. Mauzy, A. T. Smith, G. S. Swart, B. Yarrington, B. R. Pierson, E. A. Casey, N. N. Bearse, B. Thorley and J. Jaffe.

### REFERENCES

1. Chen, C. Y., *Chem. Revs.*, **55**, 595 (1955).
2. Davies, C. N., *Proc. Inst. Mech. Engrs. (London)* **B1**, 185 (1952).
3. First, M. W., R. Moschella, L. Silverman, E. Berly, *Ind. Eng. Chem.*, **43**, 1363 (1951).
4. Thomas, D. G., Ph. D. Thesis in Chemical Engineering, Ohio State University, 1953.
5. Thomas, D. J., *J. Inst. Heating Ventilating Engrs. (London)*, **20**, 35 (1952).
6. Wong, J. B., Ph. D. Thesis in Chemical Engineering, University of Illinois, 1954.

This article is based in part upon a paper presented at the MCA convention and published in the 1959 Proceedings of the Air and Water Pollution Abatement Conference sponsored by the Manufacturing Chemists Association, Inc., Washington, D. C.



JOSEPH A. BRINK, JR., was formerly assistant professor of chemical engineering at Purdue University. He received his BS and MS in chemical engineering from the University of Denver and his Ph.D., also in chemical engineering, from Purdue. After joining Monsanto's Inorganic Research Department, Dr. Brink worked on equipment and process development and is now supervising engineer in the Inorganic Engineering Department.

Recent British Symposium,

# Importable Know-How



## Analog Aids Economic Estimation

### Compute Plant Profitability

D. W. GILLINGS, Imperial Chemical Industries Ltd., Reading, England

THE APPLICATION of computing described in this paper was suggested to establish that adequate plant cost estimation could be carried out when it was not permissible to assume "averaged" production rates for the life of a plant, or that all investment was simultaneous. These are the sorts of limitations usually implicit in annual cost estimates.

There are established estimation methods which are not subject to such limitations,\* but these have not hitherto been widely accepted, one of the major reasons for this being the length of calculations required in many real situations. Analog computing of estimates was first explored for the present stage of work as offering flexibility and rapidity in operation, simplicity of programming for a wide range of examples and accuracy quite adequate for comparative estimates dealing with future operations.

#### Estimation Methods

There are basically two methods to deal with capital as opposed to revenue expenditures. A percentage of capital cost can be taken as an annual cost, and then included with the annual costs actually incurred for materials, power, labor, etc., to form a total annual cost offsetting the total annual realizations.

\* Grant, E. L. "Principles of Engineering Economy," Ronald, New York, 1950.

Alternatively, capital cost can be considered as a charge to be met in full, and its influence on operating costs as a whole expressed in several ways. Of these, one of the simplest to estimate is the pay-off time, that is, the number of years for which the process must operate at estimated costs and realizations before the plant cost has been earned. Or the total earned in the course of a given plant life may be estimated and, when corrected for the dependence of money value on time, expressed as the present worth of the undertaking.

There are, however, situations in

#### Estimating With Computer Evolutionary Optimization In-Line Blending Control

Condensed by the editors of *CE*, these papers from a British symposium held last May represent engineering thought in Europe about problems that are common internationally in process industries. Complete proceedings of the symposium will soon be available from The Institution of Chemical Engineers, 16 Belgrave Sq., London, S.W.1. Other sponsors of symposium were The Society of Instrument Technology and The British Computer Society.

which the use of single simplified expressions for the results of estimation may not be applicable. For example, estimation of alternative costs incurred by installation of different equipments in central services such as electric power, steam and gas supplies. On large sites it may be essential to expand these facilities continuously, and it is clear that many courses may be open, all of which would enable rising demands for services to be met with varying margins at varying efficiencies and at costs incurred after varying times.

Such situations do not really admit of any simplified treatment on the usual lines. It is possible to deal with varying annual charges for capital on assumed uniform depreciation rates, but if any meaning is to be infused into deductions from such expressions, all the original simplification is lost. It thus seems worth adopting a more comprehensive method, even with some apparent loss of simplicity. Instead of using devices to convert commitments to annual costs, or searching for a single index like "pay-off time," examples have been worked for a typical, though hypothetical, cost comparison using the following basis.

#### Comprehensive Estimation

A period is considered which may be the foreseeable life of the plant,



an estimated fraction of the life, or even of arbitrary duration either long or short, starting from the present day and extending some time into the future. This is divided into smaller periods, probably years in the first instance, and for each of these periods the estimated figures for costs incurred and revenues realized are set down.

These figures are considered under four headings—capital, costs dependent on time (such as some labor), costs dependent on rate of production (such as raw materials, bonus payments to labor) and realizations (also dependent on rate of production). For each costs item, a separate figure is shown for each year. As a result of the method of calculation adopted this represents the present worth of the actual forecast figure,

$$P_s = x/(1+i)^n$$

where  $P_s$  is present worth of £ $x$  payable or due after  $n$  years, at rate of interest  $100i\%$ .

Without entering into any possible controversy on the concept of present worth, it is clear that its use permits the comparison of costs incurred at any time, correcting for the variation of money value with time. The estimates can thus be presented in terms of an estimated outstanding cost or positive balance according to the costs, the earning capacity of the plant, and the time for which the plant has been in operation.

This method of estimating is comprehensive and its application can be made as thorough and exhaustive as required, but it is clear that the amount of computation, for any situation sufficiently complex to demand simplifications, would be excessive without mechanized methods.

### Analog Computer Estimating

The method can be rendered practicable by adoption of electronic analog computing. The basic sequence of operations which the computer must execute are:

1. For each annual period, form the sum of all kinds of expenditures and realizations, a net expenditure being expressed negatively.
2. Correct this sum to its present worth, taking account of the time of its incidence in the future and the prevailing rate of interest.
3. Sum all the corrected annual sums to give a cumulative total

which is potentially amassed for the life of the plant.

The operations can be carried out, respectively, by an adding amplifier, some form of multiplier and an integrator. Adding and integration present no problem; multiplication is often preferably dealt with by some means other than using a multiplier as such.

The computer operates on a number of voltage signals presented to its input; and the presentation of these voltages is an important operation in itself. For the estimating computation, it is necessary to set the inputs for each annual period and to present these inputs at the correct time during the integration. In the computer set up for first demonstration, a multiple-contact director switch assembly (Uniselect) was used in conjunction with any array of potentiometers to set the value of inputs for each year.

Fig. 1 shows the scheme. The requirement for multiplication is met for this specific task by introducing a correct exponential decay into the main operating voltage supplying the inputs. This decay follows the law from which present worth is derived, so that the total inputs are corrected before integrating.

### Apply Computer Estimating

Let's assume that a number of choices are open in planning increases in boiler and electrical generation capacity at a large works. These may be between successive installations of small units at a rate matching the rate of increase of demand, or fewer installations of larger, more efficient units which, however, spend the early part of their life under-utilized.

The situation considered may be as follows: a steady increase in annual demand for electrical energy is forecast for one site, say 20 mw./annum. The following alternatives are considered to meet this requirement for eight years' expansion:

1. One 20 mw. set initially, thereafter one per year, and an additional boiler after three years.
2. One 40 mw. set initially, thereafter one every two years, and an additional boiler after two years.
3. One 40 mw. set initially, one 40 mw. high-pressure set with higher pressure boiler after two years, one 40 mw. high-pressure set after four years.

It will also be required to explore the effect of delaying or advancing the time of installation of the sets or boilers possibly by fractions of a year and indeed to maintain the whole program of investigation flexible.

We'll assume the following costs: 20 mw. generating set, £600,000; 40 mw. generating set, £1,000,000; 40 mw. high-pressure set, £1,200,000; installed boiler, capacity as required after 40 mw. load increase, £2,000,000; boiler (same), high pressure, £2,600,000. The only running cost which varies between the three schemes is coal. At 1 lb. coal/kwh., 20 mw. increase demands 20,000 lb. coal extra per hour. For 8,000 hr./yr., total increase is 160,000,000 lb./yr. With coal at 0.75 pence/lb. annual cost for 20 mw. is £500,000. Assuming different efficiencies for different sizes and pressures, for 20 mw. set, coal cost is £500,000; for 40 mw. set, £475,000; for 40 mw. high-pressure set, £425,000.

Data on coal consumption for Scheme 3 are treated specially. On installation of high-pressure boiler and set, full load for new set is imposed at once resulting in coal consumption at lower rate corresponding to higher efficiency not only for 20 mw. increase over year of installation, but also in consumption of coal to produce energy at low rate in lieu of coal consumed at higher rate for same duty in old boiler. As load increases, more coal is consumed at higher rate and whole generating capacity in installation is fully loaded.

Assume all energy is sold at cost representing coal cost plus 33% for least efficient scheme, i.e., annual increase is £666,000—a gross simplification for this example.

### Results

The results of full calculations are set out in Fig. 2, the comparison of the three alternatives being presented by the three graphs together. Traces from the respective analog computer records are virtually identical. These were recorded at about 60 in./min. It is evident that the time of recording is very short, and results of estimating for alternatives can be recorded in rapid succession.

As indicated in Fig. 2, several figures can be derived from the graphical presentation which re-



late this to established indices for estimation, such as capital commitment, rate of return and pay-off time. The computing method is flexible—other trials might deal with small changes in the pattern of investment or with changes in realization from sales under conditions of variable demand.

### Further Application

The work described represents only an interim stage in possible developments. As it is based on a comprehensive use of all relevant data and can thus be considered fundamentally sound as a starting point for real situations, a wide range of cost situations could ultimately be dealt with. These might include, for example, simultaneous treatment of costs at steady, or steadily changing rates, and some costs incurred at arbitrary intervals, the former being represented by a constant voltage or a voltage changing at a defined rate introduced directly to the adding amplifier through its own resistance network, as an  $A_1 \dots A_n$ , in Fig. 1.

This is, of course, only one of many variants of investment and expenditure pattern all of which can, in principle, be explored without serious problems of equipment. Other detail changes in input circuits would permit application to problems in which a large number of inputs have to be used, possibly selectively, to take account of a range of variable and conflicting factors influencing operation and costs.

All the situations and all the examples dealt with so far have been considered, explicitly or implicitly, as if the figures which could be entered into an economic assessment and all the results obtained were definite, deterministic figures. In point of fact, all such figures are subject to errors.

The representations of such error can be achieved in principle by modulation of the voltages presented to the computer, so that a voltage representing a quantity  $Q$  is presented not as  $f(Q)$  but as  $f(Q \pm \sigma)$ , where  $\sigma$  = some representation of error, either precisely derived, such as the standard deviation of a mean value derived from experiment, or an expression of error in subjective judgment as, for instance, of market prospects in the distant future.

### Analog Computer Circuit Evaluates Profitability

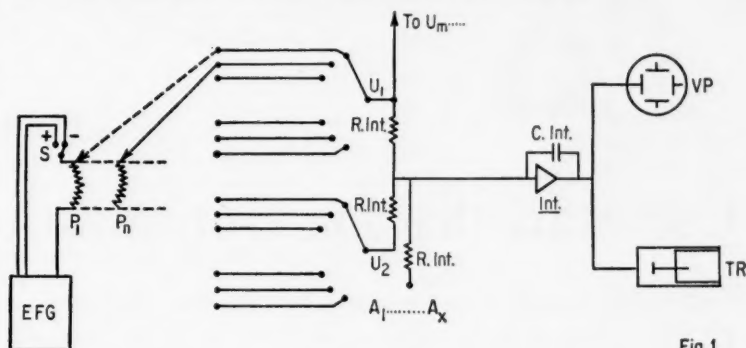


Fig. 1

$C_{int}, R_{int}$   
EFG

Amplifier components.  
Exponential function generator.  
Integrating amplifier.  
Input potentiometers.  
Positive-negative switch for expenditure-realization switching.

Int  
 $P_1 \dots P_n$   
S

TR  
 $U_1, U_2$

$U_m$   
VP  
 $A_1 \dots A_n$

Trace recorder.  
Uniselect rotary switch banks.  
Additional uniselect rotary switch.  
Visual presentation tube.  
Point for input not altered with time.

### Computer Output Draws Annual Records for Comparison

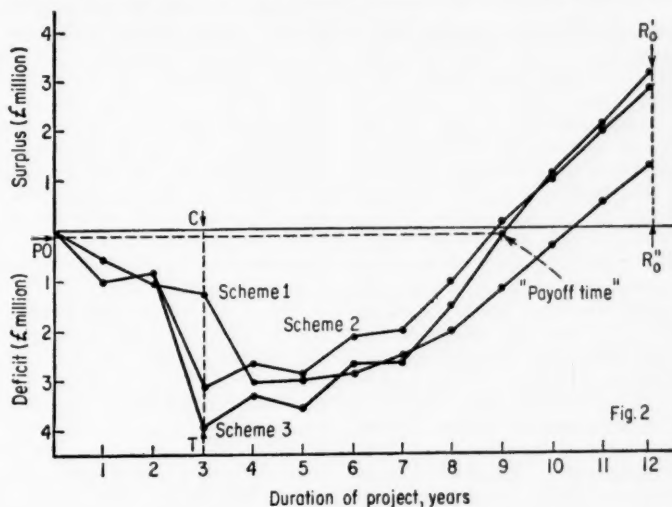


Fig. 2

TC

Present worth of total capital commitment; amount to be provided at outset to meet all commitments at time of arising.

PO

Pay-off time; time required for realizations to amount to total commitment at prevailing interest rate.

$R'R''$

Present worth of project at time in life  $L$ .

An approximate basis for comparison of rates of return and alternative projects can be derived from  $TC$  and  $R'R''$ . At a given project life

$$\text{Return}_1 / \text{Return}_2 = (R'R''_1 / R'R''_2) (TC_1 / TC_2)$$

These returns are in addition to interest. (Above traces show both hand calculation and computer solutions.)



## In-Plant Experiments Up Profit

# Use Statistics for Optimization

G. A. COUTIE, Imperial Chemical Industries, Ltd., Manchester, England

IN ANY problem of optimization, one of the most important decisions to be made is that of the response to be optimized. In simple cases it may be merely a question of maximizing the yield of a product, or perhaps of minimizing the percentage impurity, but more frequently several such responses may be of importance.

Fig. 1 gives the possible dependence of the response *purity* on the two factors, concentration and temperature, in the region of interest. These are shown in the form of response contours in the same way that height is represented on a map.

### Evolutionary Operation

Methods for process optimization on the plant scale will normally differ from those used in the laboratory largely because any process variations that are made on the plant must be sufficiently small not to interfere with the smooth running and productivity of the plant. Whereas in the laboratory fairly large variations in process conditions are permissible in order that a response-surface may be fitted, on the plant the fact that only quite small variations are allowable indicates that the variations must usually be continued for a longer time in order that their effect, if any, may be separated from the inherent error of the plant.

Arising out of these considerations, a method for plant-scale process optimization has been proposed\* known as evolutionary operation.

In this method the plant is not run at a fixed set of operating conditions as is usual in most chemical processes. Instead, systematic small modifications following a carefully planned and continuously repeated cycle are made. Because the modi-

fications are small their effect will probably not be detected in individual cycles, but as the results in successive cycles are averaged evidence of the effect of the modifications is gradually built up.

Eventually it is possible to see in what way the method of operation of the plant should be adjusted in order to obtain greater efficiency. This improvement is then incorporated by making the appropriate change and further cycles are started about the newly found conditions.

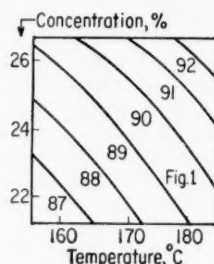
### Record the Results

In practice it has been found that it is best to vary two or three variables at a time when operating in this way, as this allows an easy visual assessment of the situation to be made at any time. The results may be recorded on a chart, such as that shown in Fig. 2, showing the nature and size of the variations being made in the current phase of operation, together with the running averages up to the last cycle completed under each set of operating conditions.

Fig. 2 shows the appearance of the information chart at the end of the seventh cycle of the second phase of operation, during which the slightly modified conditions denoted in 2, 3, 4 and 5 were run in cycles with the standard operating procedure 1. At the end of each cycle, 95% error limits are computed for each of the averages, these limits becoming narrower as more cycles are performed.

Additionally, the average effect of each variable is calculated at the end of each cycle. The effect of changing the temperature in Fig. 2, for example, from 146 C. to 150 C. is obtained by subtracting the average response obtained with the lower temperature from that at the

### Purity Contours Are Response



upper temperature. Denoting the running average at a set of operating conditions by the number corresponding to that set, the effects are derived as follows:

$$\text{Temperature effect} = \frac{1}{2} (3 + 5 - 2 - 4)$$

$$\text{Concentration effect} = \frac{1}{2} (4 + 5 - 2 - 3)$$

$$T \times C \text{ interaction} = \frac{1}{2} (5 + 2 - 3 - 4)$$

$$\text{Change in mean} = \frac{1}{2} [2 + 3 + 4 + 5 - 4(1)]$$

The final figure, the change in mean, has an important bearing on the cost of running the evolutionary operation scheme. It measures, in fact, the difference between the response that has actually been obtained, and the response that would have been obtained if the evolutionary operation scheme had not been run and the standard operating condition 1 had been adhered to.

### Further Procedure

At the end of each cycle, one of several types of decision may be taken. The possibilities are:

1. To carry on for another cycle with the same levels of the same variables.

2. To extend the range over which the variables have been tried if little effect has been observed.

3. To make a change in the standard operating conditions and to re-

\* Box, G. E. P., *Applied Statistics*, 6, 81 (1957).

start modifications from the new point if a real improvement has been detected.

4. To choose one or more new variables and to start a new phase of the operation.

In the example of Fig. 2 it is possible after the seventh cycle to say, with 95% confidence of being right, that lower costs are to be found with the temperature at 150 C. than with it at 146 C., whereas the purity is not affected much by this difference. The likely conclusion at this stage, therefore, would be to change the standard conditions by increasing the temperature by 2 deg. to 150 C., keeping the concentration at 21.0%, and to perform further modifications about this new set of conditions in phase three of the evolutionary operation.

By continually repeated applications of this method the process conditions are slowly but inevitably nudged to those that are most suitable for the particular plant that is being operated. The plant is, in effect, allowed to produce product plus information—not merely product.

The factors that have entered most frequently into some 40 ICI programs have been temperature, time and concentration, while the most common responses are yield, purity or, where possible, a composite cost function which takes into account raw material values, operating costs and yield.

## Two Applications

A batch process makes a dyestuff intermediate in each of ten similar units, the annual output being on the order of 2 million lb. The response of chief interest is the yield, which varies considerably from unit to unit and also between successive batches in the same unit.

The item for analysis when evolutionary operation was started four years ago was fixed as the average yield over all units for a week, which represented a production of about 30 batches, three from each unit. Initially 12 factors were written down, including two times, four rates, two concentrations, a temperature and a pressure. These

factors have been varied in phases of two or three at a time, and there have so far been ten phases.

It was recognized at the start that since only one observation was obtained per week, each phase of evolutionary operation could be expected to last for several months, but the potential value of an increase in efficiency was thought sufficient to justify the long-term nature of the scheme. Within the first two years, in fact, an average yield increase over all units of approximately 10% was achieved. During the second two-year period further small improvements have been gained, and the previous increase in efficiency has been maintained.

The product in another process is made by a catalytic reaction which is continuous within catalyst runs of about two weeks' duration. Plant throughput and factors associated with the catalyst have been varied between catalyst runs, giving only

one observation of response per fortnight on each of several similar reaction units. Concurrently with this variation between runs, variations have been made within runs in the ratio of the two reactants and the temperature.

Conditions are changed each day during a catalyst run, and from samples of the product taken at intervals during the day a measure of efficiency is calculated. For each combination of throughput and catalytic conditions, the variations in ratio and temperature have been planned in such a way that contours of efficiency may be plotted in terms of these two variables. In all cases so far, elliptical contours have been found, enabling the best levels of the ratio and temperature to be specified. Increases in efficiency of the order of 1% have been achieved, which, because of the volume and value of production, represent considerable savings.

## Information Chart Provides Analysis Form

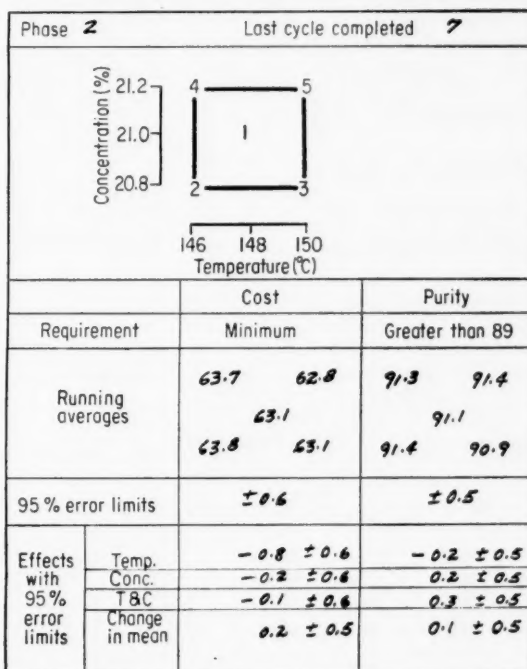


Fig. 2



## Electronics Eases Blending Job

# In-Line Ratio Flow Controller

H. H. IDZERDA, Koninklijke/Shell Laboratorium, Amsterdam, Holland

FOR accurate blending operations, accurate flow measuring devices are needed. The commonly used orifice in a pipeline in combination with a differential pressure transmitter has an accuracy of 2 to 3%. Rotometers may be used for an accuracy of 1%.

For greater accuracy, positive displacement meters are used, which can have an accuracy of 0.2% of volume flow under favorable conditions. The output of such a meter is a shaft rotation, the speed of which is proportional to volume flow. Flow integration is simply carried out by a totalizing counter. As can be seen in Fig. 1, which shows the general control circuit of a ratio blender for two flows, both flows are measured and have to be compared, taking into account the desired ratio setting. Some kind of transmission of the speed of a rotating shaft to a central point is needed.

### Electronic Solution

An electronic solution to this blending problem was found. The heart of this device is the electronic differential integrator. One ratio blender incorporating this differential integrator has been on field test for over a year and has given excellent performance.

Its accuracy was assessed by comparing the desired ratio as set on the instrument with the calculated ratio read from the two integrating counters of the flowmeters. The accuracy of the blending was better than 0.1%.

### Principle of Device

The working of this unit can best be explained by simple analogy. Consider a bathtub, partly filled with water. Two men, A and B,

each have a bucket. A fills the bathtub by means of his bucket; B empties it. If the buckets are equal in size, the average level in the bathtub can be held constant only if the men work at the same speed.

If A has a bucket twice the size of B's, B's speed must be doubled to keep the level constant. The action of the differential integrator is an almost exact electrical equivalent of the buckets and the bathtub, while the controller following it ensures that the level is kept constant.

The circuit diagram is given in its most simple form in Fig. 2. Switches  $S_1$  and  $S_2$  can be switched from left to right and vice versa. Capacitors  $C_A$  and  $C_B$  are the equivalents of the buckets;  $C_i$  the equivalent of the bathtub. In the left-hand position of the switches  $C_A$  and  $C_B$  are charged; in the right-hand position they are discharged into capacitor  $C_i$ .

If  $C_A$  and  $C_B$  are equal and the potentiometer is in mid-position ( $\alpha = \beta$ ), they are charged to an equal value but with opposite sign, and, after their discharge into  $C_i$ ,  $C_i$  remains uncharged. If  $S_1$  is switched at a frequency  $f_A$  and  $S_2$  at frequency  $f_B$ ,  $C_i$  will remain uncharged as long as  $f_A = f_B$ .

If the potentiometer is not in the mid-position,  $C_i$  is charged to a voltage  $\beta E$  and has a charge  $\beta EC_A$ ,

### Principle of Integrator

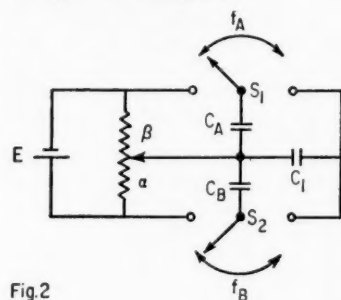


Fig. 2

and  $C_B$  has the charge  $\alpha EC_B$ . If the switches are actuated at frequencies  $f_A$  and  $f_B$ , the charge of  $C_i$  at a time  $T$  will increase by  $Q$ :

$$Q = \int_0^T (\beta EC_A f_A - \alpha EC_B f_B) dt$$

where  $\beta = 1 - \alpha$ .

Hence, for the practical case that  $C_A = C_B = C$ , the voltage increase  $e$  across  $C_i$  will be

$$e = (EC/C_i) \int_0^T (\beta f_A - \alpha f_B) dt$$

where  $f_A$  and  $f_B$  can be functions of time.

Now if by some means  $f_A$  and  $f_B$  is adjusted so as to bring  $e$  to zero, then

$$\begin{aligned} \beta f_A - \alpha f_B &= 0 \\ f_A/f_B &= \alpha/\beta \end{aligned}$$

If we suppose that  $f_A$  and  $f_B$  are proportional to the volume flows  $F_A$  and  $F_B$ , it will be clear that the desired ratio for  $F_A/F_B$  can be set by choosing  $\alpha$  by means of the potentiometer.

To realize synchronous switching of switches  $S_1$  and  $S_2$  with  $F_A$  and  $F_B$  in practice, the output shafts of the positive displacement meters carry contacting mechanisms that energize relays in the differential integrator.

### Two-Flow Ratio Control

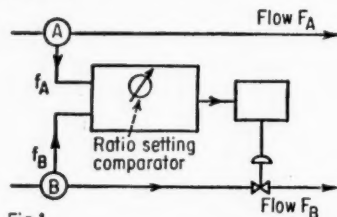
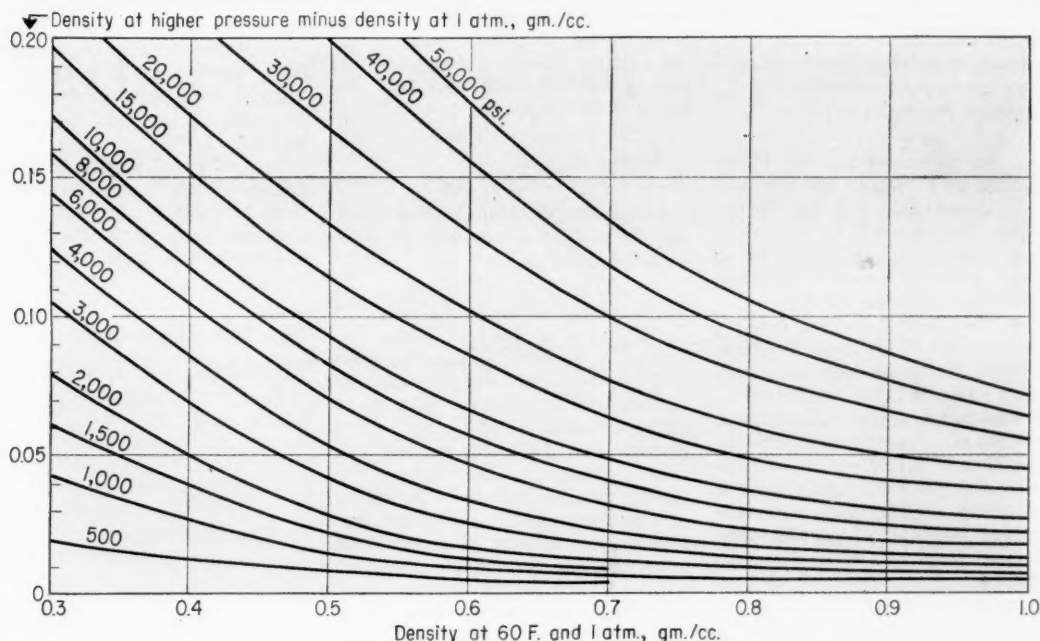


Fig. 1



## Effect of Pressure on Liquid Density



## How to Estimate Liquid Densities

Here's an intensive roundup of engineering methods.  
Your author culls the most useful from many available.

WALLACE R. GAMBILL, Union Carbide Nuclear Co., Oak Ridge, Tenn.

Many accurate and relatively simple correlations have been proposed for either calculating a liquid density with no experimental data available or for extending known data into other ranges of temperature and pressure.

Some of these methods<sup>1-4</sup> are specific to hydrocarbons and we'll not treat them in detail here. In Edmister's paper,<sup>4</sup> a modified Jessup's modulus is defined as follows:

$$N_J = 1/[\rho^2 \log(1,000 \nu)] \quad (1)$$

where  $\rho$  is density, at 60 F. in gm./

cc.; and  $\nu$  is kinematic viscosity, at 100 F. in stokes.

This modulus is correlated graphically with the UOP characterization factor  $K$  and density; with ASTM 10%-90% slope, API gravity and volumetric avg. boiling point; and with critical temperature and critical pressure (for petroleum fractions).

The Kurtz & Sankin article<sup>5</sup> contains empirical constants useful for estimating molar volumes of high-molecular-weight hydrocarbons ( $M$

> 170) over the pressure range of 1-965 atm. for  $0^\circ\text{C.} < T < 100^\circ\text{C.}$ , and for  $-100^\circ\text{C.} < T < 200^\circ\text{C.}$  at  $p = 1$  atm.

### Use These General Methods

Liquid densities at the normal boiling point,  $T_b$ , only may be estimated within  $\pm 2-3\%$  by Benson's equation,<sup>6</sup> which was tested with data for 96 liquids:

$$\rho_b = \rho_c (1.981 + 0.422 \log p_c) \quad (2)$$

where  $p_c$  is critical pressure in atm.



absolute;  $\rho_c$  is critical density; and  $\rho_b$  is density at the normal boiling point.

This relation is somewhat more accurate than Benson's other suggestion<sup>5</sup> that:

$$\rho_b = 2.68 \rho_c \quad (3)$$

Eqs. (2) and (3) do not apply very accurately to nitriles, however.

Another way to estimate  $\rho_b$  at  $T_b$  is from the molecular volume:

$$\rho_b = M/V_b \quad (4)$$

where the molecular volume,  $V_b$ , is evaluated by summing the additive contributions of Le Bas (see Table I, *Chem. Eng.*, June 2, 1958, p. 127) or of Schroeder.<sup>9</sup> However, this method may be expected to give about twice the error of Eq. (2).

For calculating liquid density data over broad ranges for both polar and nonpolar liquids, saturated or subcooled, the best generalized correlation is that of Lydersen, et al.,<sup>7</sup> which uses  $z_c$  as an additional parameter in an extensive tabulation<sup>6,7</sup> of  $\rho_c$  vs.  $T_c$  and  $p_c$ . This approach has recently been put on a graphical basis by Lu,<sup>8</sup> who published a graph of  $z_c^{0.77}/V_c$  vs.  $T_c$ , covering  $T_c$  from 0.3 to 1.0, and vs.  $p_c$ , covering  $p_c$  from 0 to 30.

Lu's method, which is valid for  $z_c > 0.24$ , is recommended for general use;  $\rho$  may be calculated in the absence of any density data or with a knowledge of a single point.

Since the Lu chart was published earlier this year in this magazine, we'll not reproduce it in this article. The Lydersen tabulation and the Lu chart are extensions of the earlier well-known Watson expansion factor graph.

Two other correlations, each of which require one value of density, are Osburn's alignment chart<sup>10</sup> of  $\rho$  vs.  $T$  and  $T_c$ , which gives avg. and max. errors for 28 compounds of 1.7% and 5.2%; and Goldhammer's simple equation:<sup>11</sup>

$$\rho_L - \rho_V = C (T_c - T)^{1/3} \quad (5)$$

$$(\rho_L - \rho_V)_2 = (\rho_L - \rho_V)_1 \left( \frac{T_c - T_2}{T_c - T_1} \right)^{1/3} \quad (6)$$

At low pressures, of course, the density of the vapor,  $\rho_v$ , is much smaller than the density of the liquid,  $\rho_L$ , and may be omitted in these equations. The writer has used the Goldhammer solution a number of times and it appears to be consistently accurate.

An equation requiring no density data is Guggenheim's:<sup>12</sup>

$$\rho_L = 1 + a(1 - T_c)^{1/3} + b(1 - T_c) \quad (7)$$

which gives good agreement with

the data when the constants are taken<sup>13</sup> as:  $a = 1.75$  and  $b = 0.75$ . Riedel proposed the following constants<sup>13</sup> for Eq. (7):

$$\begin{aligned} a &= 1.93 + 0.2(\alpha - 7) \\ b &= 0.85 \end{aligned} \quad (8)$$

where  $\alpha$  is the slope of the log vapor pressure-log temperature curve at the critical point. The parameter may, in turn, be estimated from the factor  $\omega$  as follows:<sup>13</sup>

$$\alpha = 5.808 + 4.93 \omega \quad (9)$$

or from  $z_c$  by:<sup>14</sup>

$$\alpha \approx 7 + [(1 - 3.72 z_c)/0.26 z_c] \quad (10)$$

If we know a single boiling point and  $T_c$  and  $p_c$ ,  $\alpha$  may also be estimated from:<sup>15</sup>

$$\alpha = \frac{0.314 \phi_c^*(T_b/T_c) - \ln(p_b/p_c)}{0.0838 \phi(T_b/T_c) - \ln(T_b/T_c)} \quad (11)$$

$$\phi(T_b/T_c) = 36(T_b/T_c)^{-1} - 35 - (T_b/T_c)^6 + 42 \ln(T_b/T_c) \quad (12)$$

Other liquid density correlations include the Othmer alignment chart,<sup>16</sup> based on data for 54 compounds, and the corresponding reference-substance plot,<sup>18</sup> wherein a log-log graph is made of the density of the compound under consideration vs. the density of a reference substance at constant values of  $(T_c - T)$ , to obtain straight lines.

Dreisbach & Spencer<sup>17</sup> give simple equations for  $\rho_L$ ; and Kurtz, et al.,<sup>18</sup> examined the empirical Eykman equation, which relates density with refractive index:

$$\rho_L = (n^2 - 1)/C(n + 0.4) \quad (13)$$

over an extended temperature range and found it to be quite accurate. Hanson<sup>19</sup> proposed a plot of  $V_c$  vs.  $T_c$  for five homologous series for  $0.5 < T_c < 0.97$ . This approach loses some of the generality of the Watson expansion-factor chart on which it's based, but critical pressure is not required.

Meissner & Paddison<sup>20</sup> published a graph of liquid compressibility factor,  $z_L$ , vs. reduced v.p. and reduced saturation temperature. This method applies only to saturated liquids and has not been tested for liquid mixtures. Brebach & Thodos<sup>21</sup> have recently developed an expansion-factor chart for  $z_c = 0.391$ , based on nitrogen data.

Ritter, et al.,<sup>22</sup> have presented a slightly revised version of the Watson  $\omega$  chart as well as full-page nomographs for the specific gravities of light and heavy pure liquids, paraffinic hydrocarbons and petroleum fractions. These charts cover broad ranges and are valid up to  $T_c \approx 0.9$ , within an accuracy of 0.5-2%.

## Pressure Effect on Density

The isothermal effect of pressure level on  $\rho_L$  is small except near the critical point. At 5,000 psi., for example, the densities of methyl chloride and of ethylene oxide, at  $T_b$ , are about 3.5% greater than the densities at 1 atm. Corresponding increases<sup>23</sup> for methane, ethanol and benzene are 4.5%; for cyclohexane, 5%; for butane, 5.5%; and for heptane, 7.5%.

The effect of pressure on liquid density at 60 F. may be estimated from the chart reproduced on the previous page. This chart is from the N.G.S.M.A. Data Book, 6th Ed., 1951.

## Our Recommendations

As always, use experimental data if they are available; if not calculate  $\rho_L$  at  $T_b$  with Eq. (2) if  $\rho_c$  is known or can be calculated easily. Otherwise, use Eq. (4).

For other conditions—saturated or subcooled polar or nonpolar liquids at any temperature and pressure in the liquid range—use the Lu chart<sup>8</sup> or Eqs. (5) or (7).

## REFERENCES

1. Kurtz, S. S., Jr., and M. R. Lipkin, *Ind. Eng. Chem.*, **33**, 779 (1941).
2. Kurtz, S. S., Jr., and A. Sankin, *Ind. Eng. Chem.*, **46**, 2186-2191 (1954).
3. Brown, G. G., D. L. Katz, G. G. Oberfell and E. C. Alden, "Natural Gasoline and the Volatile Hydrocarbons," 48-56, N.G.S.M.A. (1948).
4. Edmister, W. C., and W. S. Hanna, *Pet. Refiner*, May 1958, pp. 227-233.
5. Benson, S. W., *J. Phys. & Colloid Chem.*, **52**, 1060-1074 (1948).
6. Reid, R. C., and T. K. Sherwood, "The Properties of Gases and Liquids," pp. 51-52, McGraw-Hill, New York (1958).
7. Lydersen, A. L., R. A. Greenkorn and O. A. Hougen, *Univ. of Wis. Expt. Sta. Report No. 4*, Oct. 1955.
8. Lu, B. C.-Y., *Chem. Eng.*, May 4, 1959, p. 137.
9. Watson, K. M., *Ind. Eng. Chem.*, **35**, 399 (1943).
10. Osburn, J. O., *Chem. Eng.*, Mar. 1956, p. 196.
11. Goldhammer, Z. *Physik Chem.*, **71**, 577 (1910).
12. Guggenheim, E. A., *J. Chem. Phys.*, **13**, 253 (1945).
13. Riedel, L., *Chem. Ing. Tech.*, **26**, 259 (1954).
14. Riedel, L., *Chem. Ing. Tech.*, **26**, 679 (1954).
15. Hirschfelder, J. O., R. J. Buehler, H. A. McGee, Jr., and J. R. Sutton, *Ind. Eng. Chem.*, **50**, 375-385 (1958).
16. Othmer, D. F., S. Josefowitz and A. E. Schmutzler, *Ind. Eng. Chem.*, **40**, 883-885 (1948).
17. Dreisbach, R. R., and R. S. Spencer, *Ind. Eng. Chem.*, **41**, 1363-1366 (1949).
18. Kurtz, S. S., Jr., S. Amon and A. Sankin, *Ind. Eng. Chem.*, **42**, 174-175 (1950).
19. Hanson, E. S., *Ind. Eng. Chem.*, **41**, 96-99 (1949).
20. Meissner, H. P., and O. H. Paddison, Jr., *Ind. Eng. Chem.*, **33**, 1189-1191 (1941).
21. Brebach, W. J., and G. Thodos, *Chem. & Eng. Data Series*, **3**, No. 2, 338-341 (1958).
22. Ritter, R. B., J. M. Lenoir and J. L. Schweppe, *Pet. Refiner*, Nov. 1958, p. 225.

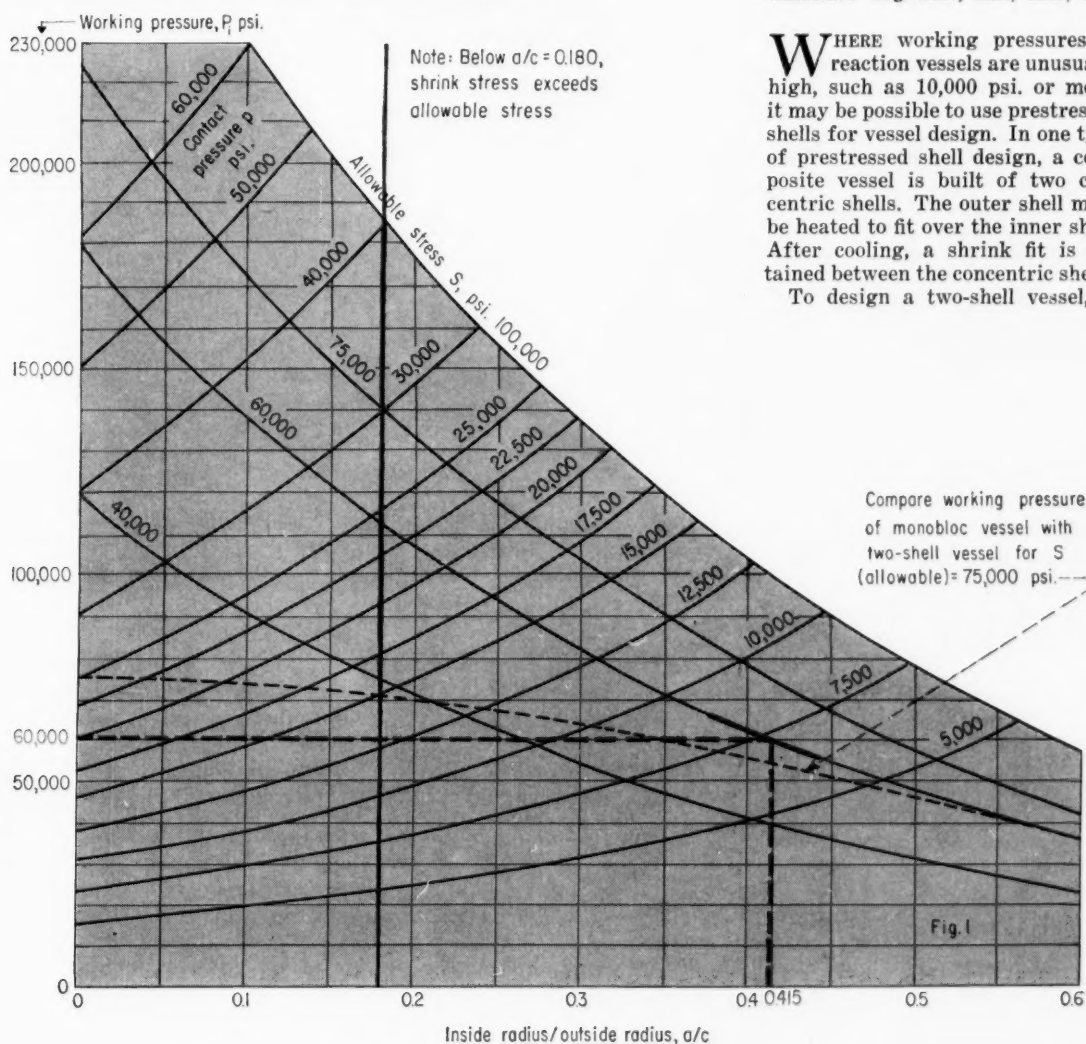
# Charts Size Composite Vessels

Use charts to eliminate trial-and-error calculations for the dimensions of two-shell composite vessels which operate at high working pressures.

## Find Contact Pressure and Radial Dimensions

T. M. SIMONIAN  
Autoclave Engineers, Inc., Erie, Pa.

WHERE working pressures in reaction vessels are unusually high, such as 10,000 psi. or more, it may be possible to use prestressed shells for vessel design. In one type of prestressed shell design, a composite vessel is built of two concentric shells. The outer shell must be heated to fit over the inner shell. After cooling, a shrink fit is obtained between the concentric shells. To design a two-shell vessel, it



is necessary to calculate the inside and outside diameter of each shell and then compute the required shrinkage. In this article, we'll present charts that give the dimensions of composite vessels without any laborious trial-and-error calculations. Calculations which previously took hours can now be done in minutes with the aid of these charts. First we'll solve a problem; and then give stress-analysis basis for the charts.

### Example Illustrates Method

Design a composite vessel with a 12-in. I.D. to operate at an internal pressure of 60,000 psi. Use a maximum allowable stress for the material of 60,000 psi.

In Fig. 1, at the intersection of working pressure  $p_i = 60,000$  psi. and of allowable stress  $S = 60,000$  psi., read contact pressure  $p$  of 7,100 psi. From this point move vertically down to read ratio of inside radius

to outside radius  $a/c$  which is 0.415. Then,  $c$  is 6/0.415 or 14.25 in. outside radius. From Eq. (2), find  $b$  which equals  $(ac)^{0.5}$  or 9.4 in.

For a contact pressure of 7,100 psi. and  $a/c = 0.415$ , find  $\delta/b$  which is 0.00125 from Fig. 2. Hence, radial interference  $\delta = 0.00125 \times 9.4$  or 0.0118 in. Diametrical interference equals  $2\delta$  or 0.0236 in.

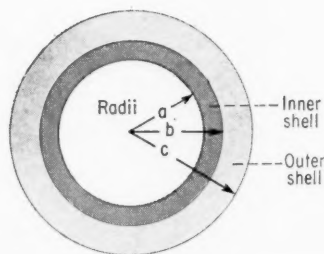
Therefore, complete dimensions for the composite vessel are: inner shell has 12-in. I.D. and 18.8-in. O.D. plus diametrical interference of 0.0236 in.; outer shell has 18.8-in. I.D. and 28.5-in. O.D.

### Composite Vessel Design

Equations used for the construction of Figs. 1 and 2 reflect the mathematical analysis of stress relations in thick-walled and multi-shell cylindrical vessels.

For the composite vessel whose cross section is shown below, Timoshenko<sup>1</sup> gives the following equation for the pressure produced between the shells after assembly:

$$p = \frac{E\delta}{b} \left[ \frac{(b^2 - a^2)(c^2 - b^2)}{2b^2(c^2 - a^2)} \right] \quad (1)$$



R. R. Maccary and R. F. Fey<sup>2</sup> state that the smallest value of tangential stress is obtained when the ratio of the external and internal diameters of each shell is equal. In terms of the dimensions shown in the drawing, this relation is:

$$a/b = b/c \quad (2)$$

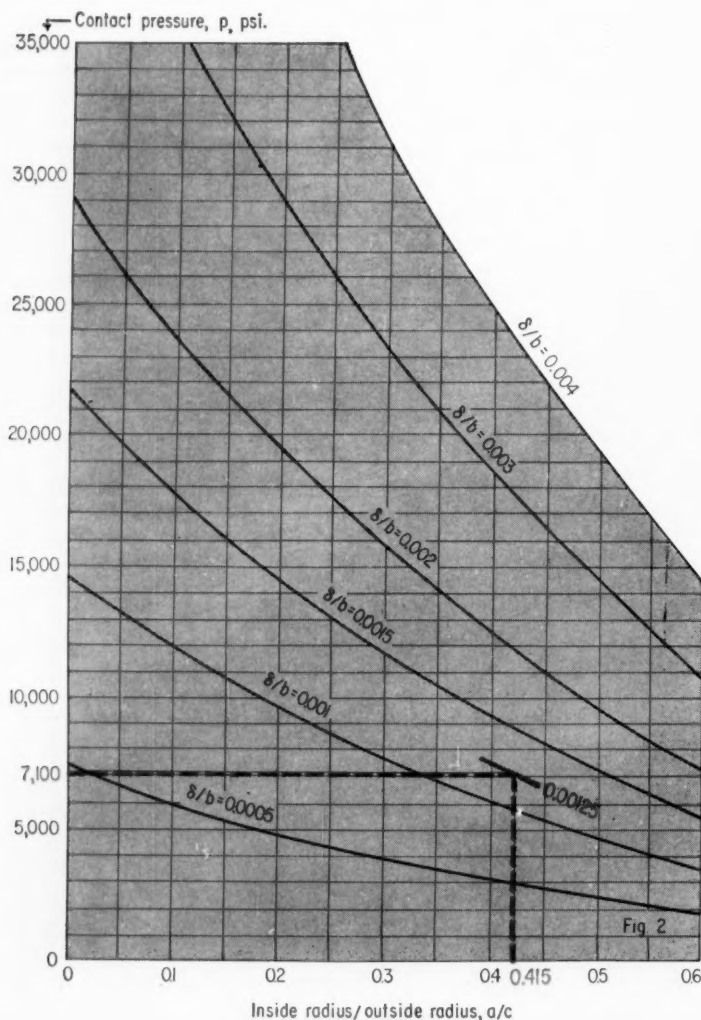
By combining Eqs. (1) and (2), we obtain the following:

$$p = \left[ \frac{1 - (a/c)}{1 + (a/c)} \right] \frac{E\delta}{2b} \quad (3)$$

Eq. (3) is the basis for Fig. 2.

Maximum stress occurs at either

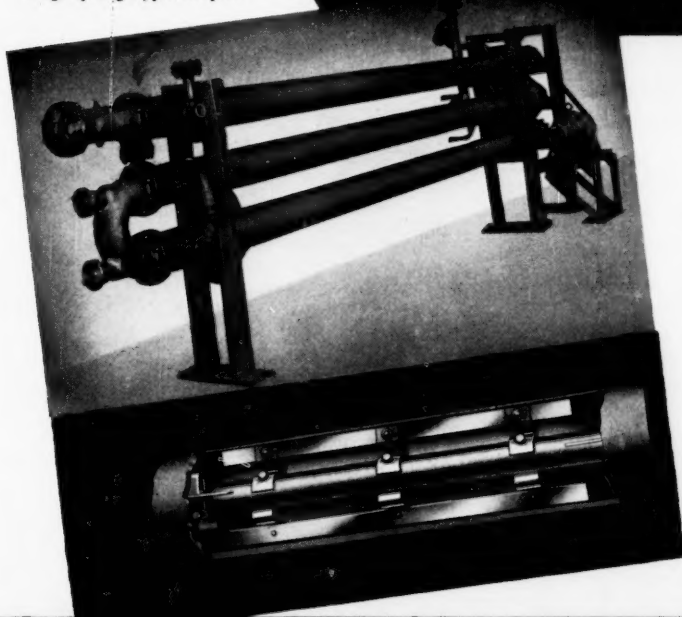
### Determine Radial Interference for Shrink Fit



# Vogt

## *Solve* EXCHANGERS Heat Transfer and Crystallization

BELOW: A scraped surface unit for production of Para-Xylene by fractional crystallization. Insert shows detail of Vogt Spring Type Scraper.



### *... And Here's How:*

1. Rotating scraper action continuously sweeps surfaces clean even while processing highly adhesive materials.
2. Uniform rate of heat transfer keeps crystallization under control and discharges crystals as a slurry.
3. Product is thoroughly mixed by scraper blades as it flows.
4. Closed, pressure-type system permits use of flammable, volatile and expensive solvents with complete safety and no solvent loss.
5. Units fabricated from a broad range of materials to suit process stream characteristics.

Write for Literature. Address Dept. 24A-XC

Listed here is a wide variety of materials which have been successfully processed with Vogt Scraped Surface Exchangers in the chemical, petro-chemical, petroleum and related industries.

**Benzene Hexachloride**  
**Caustic Soda**  
**Caustic Potash**  
**Clay**  
**Cylinder Stock**  
**Para-Dichlorobenzene**  
**Fatty Acid Solutions**  
**Fish Oil**  
**Linseed Oil**

**Naphthalene**  
**Paratone & Solids**  
**Phenolic Resins**  
**Polyester Liquid**  
**Pressed Distillate**  
**Reduced Petroleum**  
**Waxy Oil-Solvent Mix**  
**Soybean Oil**  
**Sperm Oil**

**Sugar Syrup**  
**Sulfur-Oil Mix**  
**Sulphate Solution**  
**Tall Oil-Naphtha-Sulfuric Acid Solutions**  
**Tetrachloro Benzene**  
**Viscose**  
**Wax Slurry**  
**Para-Xylene**

**HENRY VOGT MACHINE CO.**  
Louisville 10, Ky.





inside radius of inner shell, or inside radius of outer shell, or at both. The initial stresses<sup>1</sup> due to shrinkage are:

$$(\sigma_i)_{r=a} = -p \left( \frac{2b^2}{b^2 - a^2} \right) \quad (4)$$

### Find Temperature for Shrink Fit

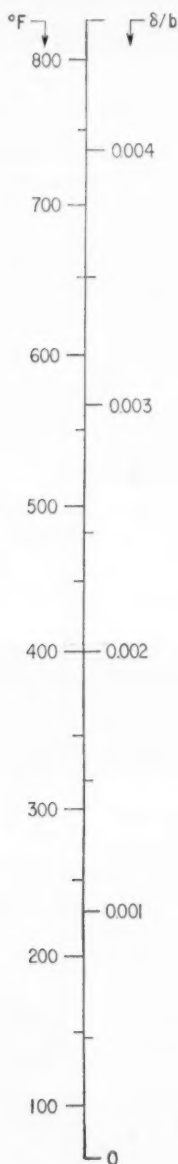


Fig. 3

$$(\sigma_i)_{r=b_o} = p \left( \frac{b^2 + c^2}{c^2 - b^2} \right) \quad (5)$$

Stresses due to internal pressure<sup>2</sup> are:

$$(\sigma_i)_{r=a} = p_i \left( \frac{c^2 + a^2}{c^2 - a^2} \right) \quad (6)$$

$$(\sigma_i)_{r=b_o} = p_i \left[ \frac{a^2}{c^2 - a^2} \right] \left[ 1 + \frac{c^2}{b^2} \right] \quad (7)$$

Total stress at  $r = a$  is equal to the sum of initial stresses due to shrinkage and stresses due to internal pressure. Hence,

$$(\sigma_i)_{r=a} = p_i \left[ \frac{c^2 + a^2}{c^2 - a^2} \right] - p \left[ \frac{2b^2}{b^2 - a^2} \right] \quad (8)$$

In a similar manner the total stress at  $r = b_o$  is obtained.

$$(\sigma_i)_{r=b_o} = p_i \left( \frac{a^2}{c^2 - a^2} \right) \left( 1 + \frac{c^2}{b^2} \right) + p \left( \frac{b^2 + c^2}{c^2 - b^2} \right) \quad (9)$$

Combining Eqs. (2) and (8), we obtain the total stress at  $r = a$  as:

$$(\sigma_i)_{r=a} = p_i \left[ \frac{1 + (a^2/c^2)}{1 - (a^2/c^2)} \right] - p \left[ \frac{2}{1 - (a/c)} \right] \quad (10)$$

Combining Eqs. (2) and (9), we obtain the total stress at  $r = b_o$ .

$$(\sigma_i)_{r=b_o} = p_i \left[ \frac{a/c}{1 - (a/c)} \right] + p \left[ \frac{1 + (a/c)}{1 - (a/c)} \right] \quad (11)$$

The contact pressure remains the same in Eqs. (10) and (11). Solving them simultaneously, we obtain:

$$p_i = \frac{[1 - (a/c)][(a/c) + 3]}{[(a/c) + 1]^2} S \quad (12)$$

The most economical design occurs when the total stress  $S$ , at  $r = a$  equals the total stress at  $r = b_o$ . Again solving Eqs. (10) and (11) simultaneously and eliminating  $\sigma$ , we obtain:

$$p = \frac{[1 - (a/c)]}{[1 + (a/c)][(a/c) + 3]} p_i \quad (13)$$

For the graphical presentation of Eqs. (12) and (13), see Fig. 1.

Approximate temperature required for shrink fit of concentric shells is given by the following equation:

$$\delta/b = \alpha \Delta T \quad (14)$$

If mean coefficient of expansion  $\alpha$  is  $6 \times 10^{-6}$  the approximate tem-

### Nomenclature

$a$	Inside radius of inner shell.
$b$	Outside radius of inner shell or inside of outer shell.
$c$	Outside radius of outer shell.
$E$	Modulus of elasticity.
$p$	Contact pressure, psi.
$p_i$	Working pressure, psi.
$r$	Radius.
$S$	Allowable stress, psi.
$\delta$	Radial interference, in.
$\sigma_t$	Tangential stress, psi.

perature may be found from Fig. 3.

It is possible that the governing stress may be the initial shrink stresses at  $r = a$  and  $r = b_o$ . By comparing these shrink stresses, we find stress at  $r = a$  is maximum. Rewriting Eq. (4) gives:

$$(\sigma_i)_{r=a} = - \frac{2p}{1 - (a/c)} \quad (15)$$

Combining Eqs. (10) and (11) and eliminating  $p_i$ , we obtain:

$$\sigma_i = \frac{(1 + (a/c))^2}{(1 - (a/c))^2} p \quad (16)$$

We find the shrink stress of Eq. (15) is greater than combined stress of Eq. (16) for values of  $a/c$  less than 0.180.

### REFERENCES

1. Timoshenko, S., "Strength of Materials," Part II, 2d. Ed., pp. 239-242, D. Van Nostrand, New York, 1941.
2. Maccary, R. R., R. F. Fey, *Chem. Eng.*, Sept. 1949, p. 107.

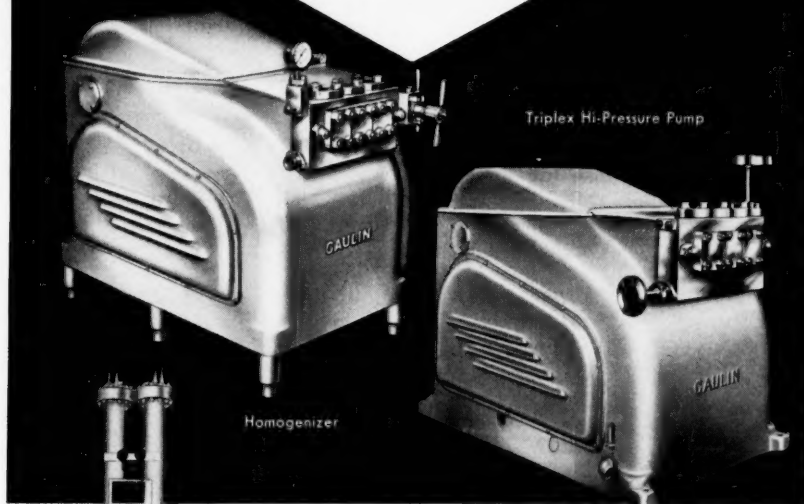


T. M. SIMONIAN is with Autoclave Engineers, Inc. as design engineer of high pressure research equipment. Prior to 1955, he was project engineer on research pilot plants for Standard Oil Co. (Ind.).

Mr. Simonian is a graduate of Pennsylvania State Univ. and has the B.S. degree in mechanical engineering. He is also a member of ASME and ISA.

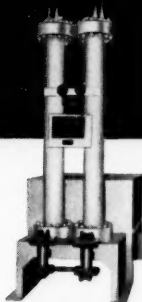


**GAULIN  
G. T. A.**  
(GAULIN TECHNICAL ASSISTANCE)  
**Is the key to Savings  
IN  
MIXING OR MOVING  
PRODUCTS**



Homogenizer

Triplex Hi-Pressure Pump



HX-Hydraulic  
Pressure Exchange Pump



RE Colloid  
Mill

If you disperse, emulsify, blend particles . . . or pump, control, move liquids, Gaulin Technical Assistance *plus* Gaulin Equipment will bring you new product improvement and cost-saving solutions to your operations.

*Gaulin Technical Assistance* starts with the GTA library of product information. Ask for all or specific bulletins on each piece of equipment. Then, call for specialized GTA to bring you experienced advice and factual data on the best way to mix or move your product.

Fifty years' experience in analyzing fluid systems plus complete laboratory sampling and test facilities make *Gaulin Technical Assistance* the "extra" man in your product or process development program.

**LOOK INTO GTA AT THE CHEMICAL SHOW  
BOOTH 51 — NOV. 30 to DEC. 4**



71 Garden Street,

Everett 49, Mass.

**Ask GTA...**

Gaulin Technical Assistance — for data on the complete Gaulin line: Homogenizers, Colloid Mills, Submicron Disperser, Triplex High Pressure Pumps and HX Pumps. Get GTA from your nearest Manton-Gaulin Representative . . .

**Akron 8, Ohio**  
White Industrial Sales and Equipment Company  
919 Second National Bldg.  
**Birmingham 6, Alabama**  
D. B. Gooch Associates, Inc.  
5018 First Avenue, North  
**Boston, Mass.**  
Joseph H. Bertram & Company, Inc.  
570 Hillside Avenue  
Needham Heights 94, Mass.  
**Buffalo 6, N. Y.**  
A. W. Johnston Co.  
2021 Clinton St.  
**Calgary, Alberta**  
Harvey Carruthers, Limited  
122 17th Avenue, S.E.  
**Charleston 1, West Va.**  
White Industrial Sales and Equipment Company  
1033 Quarrier Bldg.  
**Chicago 6, Ill.**  
Fuente and Webster Inc.  
549 West Randolph St.  
**Cincinnati 2, Ohio**  
White Industrial Sales and Equipment Company  
140 West Sixth St.  
**Cleaverwater, Pa.**  
Johnson Roney II and Associates  
P. O. Box 26  
**Cleveland 20, Ohio**  
White Industrial Sales and Equipment Company  
3639 Lee Road  
**Detroit 36, Mich.**  
H. A. Reed Company  
19465 James Couzens Highway  
**Denver 18, Colorado**  
Allred & McCabe  
847 East 17th Ave.  
**Houston 2, Texas**  
Edward Soph Company  
768A M & M Bldg.  
**Indianapolis, Indiana**  
Avels Sales & Engineering Co.  
1407 E. Riverside Dr.  
**Los Angeles 39, Calif.**  
E. M. Underwood and Company  
2901 Rowena Avenue  
**Minneapolis 3, Minn.**  
George R. Mellema Co.  
620 Plymouth Bldg.  
**Montreal 9, P. Q.**  
Richardson Agencies Ltd.  
620 Laurier Blvd., Suite 4  
Postal Address: P. O. Box 2, Station O,  
Montreal 9, P. Q.  
**Newark, New Jersey**  
Frederick E. Herstein & Associates  
Benning Building  
1429 Route 22  
Mountainside, N. J.  
**New York City 24, N. Y.**  
Kenneth S. Valentine Inc.  
111 West 83rd St.  
**Oakland 11, California**  
E. M. Underwood and Company  
4385 Piedmont Ave.  
**Philadelphia, Pennsylvania**  
R. W. Fox Company  
P. O. Box 196  
Newtown Square, Pa.  
**Pittsburgh 22, Pa.**  
White Ind. Sales and Equipment Co.  
612 Farmers Bank Bldg.  
**Portland 14, Oregon**  
The Burhans-Sharpe Co.  
Weatherly Building  
**St. Louis 8, Missouri**  
Wharton L. Peters Machinery Company  
3863 West Pine Blvd.  
**Seattle 4, Washington**  
The Burhans-Sharpe Co.  
1731 First Avenue, S.  
**Toronto, Ontario**  
Richardson Agencies Ltd.  
164 Bentworth Ave.  
Postal Address: P. O. Box 8, Station T.  
Toronto 19, Ontario  
**Tulsa, Oklahoma**  
Edward Soph Company  
202 East 18th St.  
**Vancouver 9, B. C.**  
Harvey Carruthers, Limited  
1639 West 5th Avenue  
**West Hartford 7, Conn.**  
Joseph H. Bertram & Company, Inc.  
998 Farmington Avenue

World's largest manufacturer of stainless steel reciprocating, rotary, pressure exchange pumps, dispersers, homogenizers and colloid mills.

### Compute Labor Needs for Electrical Circuits

The information in this Cost file is from a handbook for training engineers in maintenance cost estimating. Use of labor factors makes it possible to apply

local wage rates to these tasks. Mr. Clark is an officer of the American Assn. of Cost Engineers.

#### Labor Factors: Switchgear

For motor drives, the combination starter and disconnect is now standard for switchgear mounted on open racks and for minor additions to existing facilities. Average man-hours required to install various size units are shown in Table I. Labor covers only handling and mounting of unit on existing racks.

Labor Factors: Switchgear—Table I

Size	Horsepower	Man-Hours
1—"F".....	1/6 - 7 1/2.....	6
2—"F".....	10 - 25.....	9
3—"F".....	30 - 40.....	10
3—"J".....	50.....	12
4—"J".....	60 - 100.....	18
5—"K6".....	125 - 150.....	22

#### Labor Factors: Conduit & Wire

Labor Factors: Conduit—Table II

Conduit	Man-Hours/100 Ft.
1/2 in.....	10
3/4.....	12
1.....	14
1 1/4.....	15 1/2
1 1/2.....	16 1/2

Labor Factors: Wire—Table III

Wire Number	Man-Hours/100 Ft.
14.....	0.8
12.....	0.8
10.....	1.0
8.....	1.2
6.....	1.5

#### Labor for Electrical Fittings

The following table shows labor (man-hr.) required for installation of electrical fittings. Column heading abbreviations are as follows: FS, vapor-proof outlet box; T&TA, vapor-proof tees; GUAT, explosion-proof tees; EL&LB, elbows; UNY, unions; EYS, explosion-proof seals.

Labor Factors for Fittings—Table IV

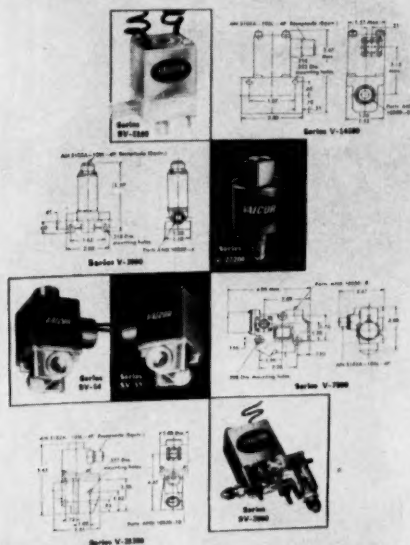
Size	FS	T & TA	GUAT	EL & LB	UNY	EYS
1/2 in.	0.75	0.5	1.0	0.5	0.4	0.6
3/4	1.0	0.5	1.5	0.5	0.5	0.6
1	1.5	0.7	2.0	0.6	0.9	1.0
1 1/4		1.0	2.2	0.75	1.5	1.0
2		1.2		1.6	1.8	1.5

#### Let Us Hear From You

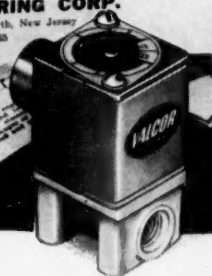
Send your cost data, preferably in tabular or graphical form and with a minimum of text, to CE Cost File Editor, Chemical Engineering, 330 W. 42nd St., New York 36, N. Y. Any legible form is acceptable. We will pay regular department space rates for all the material published in Cost File.

# FREE!

## How to Specify SOLENOID VALVES



**VALCOR ENGINEERING CORP.**  
865 Carnegie Ave., Kenilworth, New Jersey  
CHestnut 5-1665



## “How To Specify Solenoid Valves”

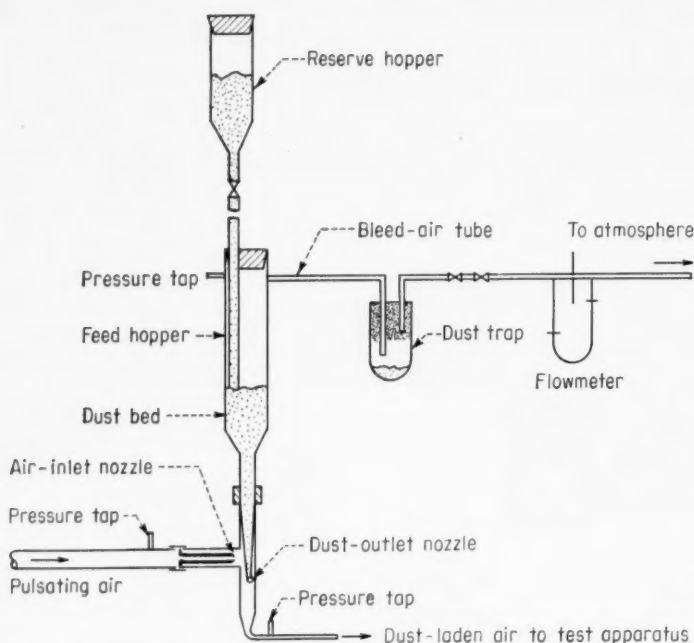
An authoritative booklet, fully illustrated with page after page of schematics, flow charts and diagrams, covering every important solenoid valve design. A complete guide for calculating flow and pressure drop characteristics...how to determine the most suitable valve configuration...what type of sealing principle is best for you...how to eliminate costly over-specifying. Invaluable to engineering and purchasing personnel.

Write today for your free copy.



**VALCOR ENGINEERING CORP.**

5372 Carnegie Ave., Kenilworth, N. J. • CHestnut 5-1665



## Laboratory Dust Feeder Covers Wide Rate Range

C. C. Shale

Chief, Gas Purification Section, Branch of Coal Gasification  
U. S. Bureau of Mines, Morgantown, W. Va.

Many types of dust-feeding devices are available for creating dust-laden gas streams for use in laboratory studies of solids-gas systems and the performance of dust-removing equipment. The selection of a particular feeder usually depends on the scale of the work and de-

gree of reproducibility that is necessary for the resulting dispersion.

Shown above is a counter-flow pulsating feeder which injects dust into a gas stream over a wide range of feed rates, with results that are reproducible on both weight and size-

distribution bases. Dust feed rate is a function of the size of openings in the gas-inlet and dust-outlet nozzles, the depth of the dust bed, the rate of flow of bleed gas, and the operating pressure.

During the development of the feeder we employed a constant frequency of 750 impulses of air per min., at constant magnitude. However, it is probable that a variation in frequency and magnitude would also affect feed rate.

Our feeder has been used to inject dust into 25 cu. ft./hr. of carrier gas at feed rates ranging from less than 1 gm./hr. to as high as 200 gm./hr.

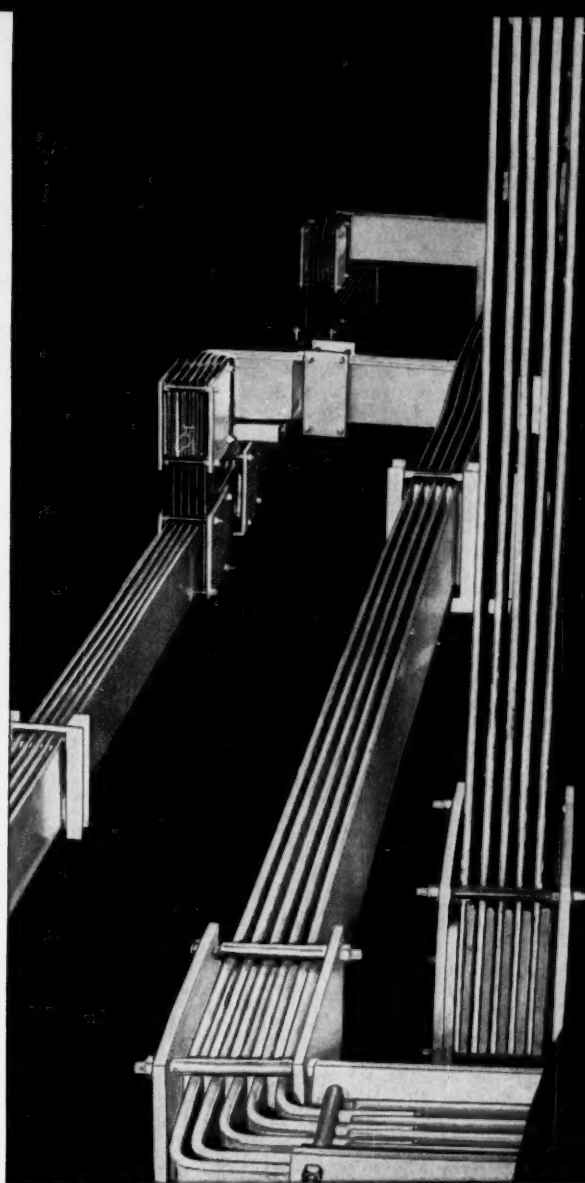
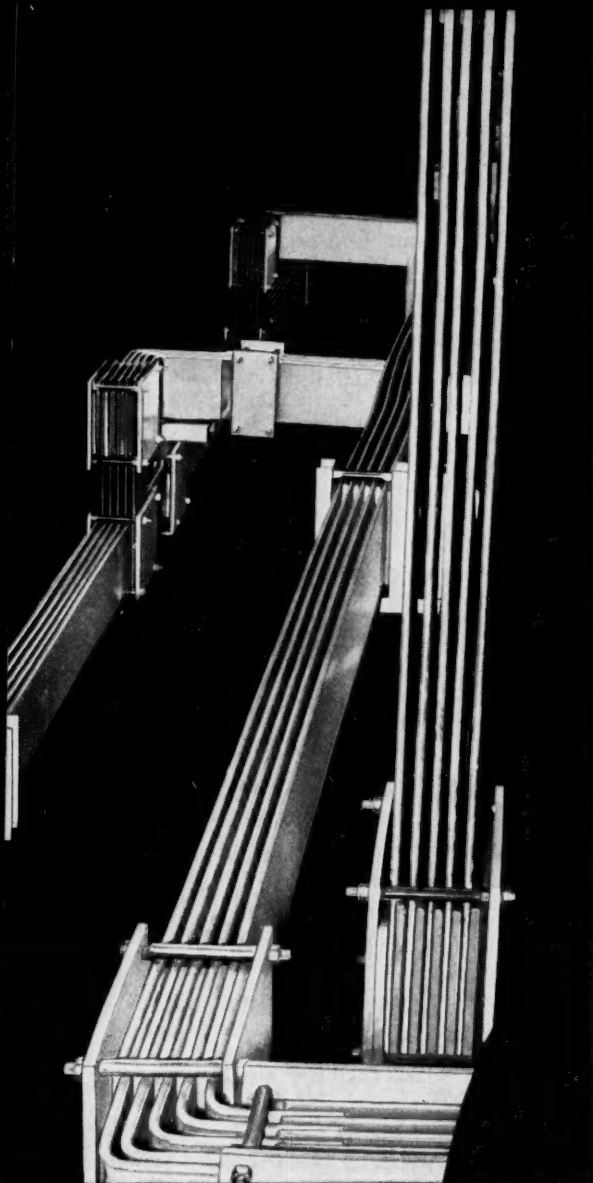
The feeder is constructed from glassware normally found in any laboratory—in diameters ranging from 8 to 50 mm. The dust bed is 8 in. high while the air-inlet and dust-outlet nozzles are 4 and 2.65 mm. in diameter, respectively. The pulsating air supply comes from the exhaust of a vacuum pump which maintains pressure of 40 in. w.g.

The pulsating air is admitted to the feeder at a controlled rate through the orifice just above the dust-outlet nozzle. At each impulse peak, a small quantity of the carrier air flows up through the dust-outlet nozzle and the dust bed and escapes through a bleed-air tube above the dust bed. At the low-pressure point in each impulse the air flow through the nozzle reverses and a small increment of dust is entrained by the pulsating carrier-air stream.

The action described results in a continuous flow of pulsating air through the bleed-air line, and an intermittent discharge of dust from the outlet nozzle. Although the increments of dust are small, the dispersion is virtually continuous since the frequency of discharge is high. Apparently, the dust is dispersed by turbulence into the carrier stream.

Dust in the bed is maintained in a settled state to hold a constant depth, bleed air channeling through the bed. Dust in the connecting tube below the bed and in the dust-outlet nozzle is

**NEXT ISSUE: Watch for October Contest Winner; Learn How Readers Can Win \$50 Monthly and \$100 Annual Prizes.**



WITH ALCOA ALUMINUM BUS CONDUCTOR...

# twice as much for the same price

IT'S TRUE—for conductors with the *same* electrical and heat-dissipating ratings, you can buy, today, *two* feet of Alcoa bus for the price of just *one* foot of copper.

BUT MATERIAL cost is only part of the story. Lightweight Alcoa® Aluminum Bus Conductor handles more easily and requires less costly supporting structures. It's easier to bend and form to your needs. Millions of pounds of aluminum bus are in service today in all types of industry.

SO WHY ever use *any* bus except Alcoa Aluminum? There's not a reason in the world . . . not these days! For up-to-date facts and figures on how much *you* can save, call Alcoa or your Alcoa Distributor. Aluminum Company of America, 2120-L Alcoa Building, Pittsburgh 19, Pennsylvania.



Write on  
company  
letterhead for  
*Alcoa Aluminum  
Bus Conductor  
Handbook*

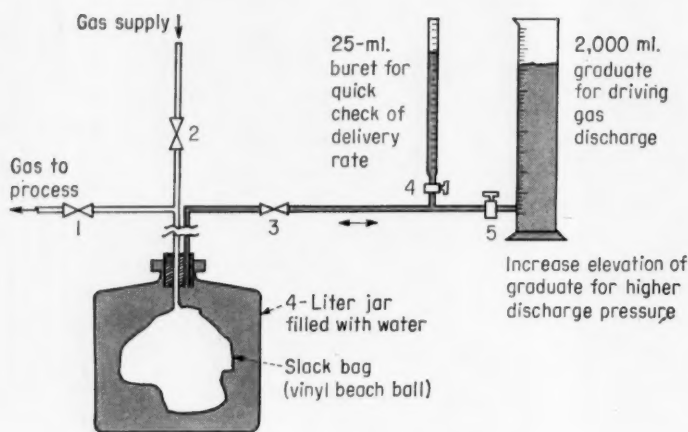




kept fluidized by the velocity of the pulsating air. This eliminates packing in the outlet nozzle.

Feeders must be calibrated for each particular quality and size consist of dust used. However, dust-feed rate will increase with lower bleed-air rates, with higher

operating pressures, shallower dust beds, or larger orifices in the air-inlet and dust-outlet nozzles. The dust-feed rate will remain constant if the average operating pressure and the pressure differential across the dust-outlet nozzle and dust bed are maintained constant.



## Meterless Regulator for Gas

Thomas J. Dixon

Chemical Engineer, Elmore, Ohio

Sometimes, in laboratory and pilot-plant work, we need to control a very small flow of gas, in the range of cc.'s per minute. Usually the answer is a small rotameter or orifice meter, but there are cases when the small rotameter isn't available, while the nature of the gas precludes the use of any practicable manometer liquid. Then the problem becomes a little tricky.

The setup above shows how we solved the problem for a flow of 10 cc./min., and less, of ammonia in a case where there was no time to order a laboratory rotameter.

The idea is simply to contain the gas in a slack plastic bag which is submerged in water in a jar. By letting water flow into the jar at a controlled rate, the gas is displaced (also at a controlled rate) to the process.

Before starting, the plastic bag

—which is a dime-store vinyl beach ball—is purged with the gas to be fed. Then fill the water side of the jar to drive out all gas. With valves 3, 4 and 5 open and valve 1 closed, open valve 2 and admit supply gas until the bag contains enough as shown by the increases in water volume in the buret and the graduate. Now, with valves 2 and 5 closed and valve 1 open, adjust the desired outflow rate with valve 3, by observation of the rate of outflow from the buret. When the desired rate is obtained, open valve 5.

As long as the graduate and buret are high enough to insure little percent change in head during, say, a 2-hr. run, there will be little change in flow rate. Of course, a metering pump, if available, would be more accurate than the gravity arrangement.

## Handling Exponents on Your Log-Log Rule

Martin R. Levy

Chemical Engineer  
Charlottesville, Va.

In repetitive calculations involving  $e^n$  or  $e^{-n}$  the log-log slide rule is a great timesaver. However, the log-log rule's exponential scales extend only to values of  $n = 10$  and  $-10$ . For larger values of  $n$ , two or more calculations must be made. For example,  $e^{18} = (e^{10})(e^8)$ ; and  $e^{21.5} = (e^{10})(e^{11.5})$ , so it is necessary to find two or three individual values, then multiply them.

A case where a simplification would be important occurs in the design of reactors where we are confronted with a rate equation which is often of the form of:

$$r = aC^b e^{-k/RT} \quad (1)$$

Here  $a$ ,  $b$  and  $k$  are constants and  $C$  is a concentration term which usually varies with the conversion.

In the non-isothermal design of a reactor a stepwise integration procedure is readily employed, involving the continuous recalculation of the rate equation at various temperatures and conversions. The  $e$  exponential need not be too troublesome if the trick described here is used.

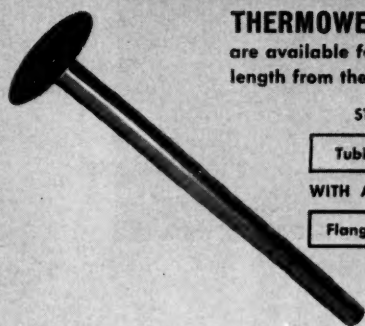
To put this idea into effect, it is first necessary to determine approximately the range of values of the exponent  $k/RT$ . It is usually possible to estimate approximately what maximum and minimum values of temperature will be used. Then,  $T_{max}$  will result in the minimum and  $T_{min}$  in the maximum value of the exponent of  $e$ . Suppose that the minimum value of  $k/RT$  will be 21.5. Then rewrite the equation as:

$$r = ae^{21.5} C^b e^{1.5} \quad (2)$$

which can be done since  $e^{21.5} = (e^{10})(e^{11.5})$ . Now,  $e^{21.5}$  needs to be calculated only once and it can then be incorporated into the constant. For each following calculation, the exponent is calculated, 20 is subtracted from it and the remainder then is used as the exponent of the second  $e$  in Eq. (2). With exponents between 10 and 20 this saves one step, or between 20 and 30 two steps, each time the equation is recalculated.

# MORE **FANSTEEL**<sup>®</sup> ACIDPROOF TANTALUM EQUIPMENT

*Now Available from Stock\**



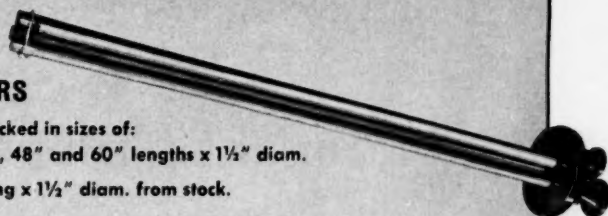
**THERMOWELLS** A large variety of Fansteel Tantalum Thermometer Wells are available for prompt delivery. They are quickly fabricated to your specified length from the standard size components listed below:

STOCKED TUBING OF THESE DIAMETERS ARE COMBINED

Tubing, I.D.	1/2"	3/4"	1"	1 1/4"
--------------	------	------	----	--------

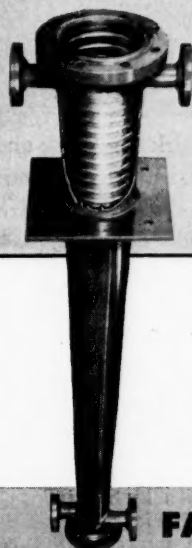
WITH ANY OF THESE STOCKED FLANGES FOR QUICK FABRICATION

Flanges, O.D.	2"	2 1/2"	3"	5"	6 3/4"
---------------	----	--------	----	----	--------



## BAYONET HEATERS

Single tube types are stocked in sizes of:  
18" long x 1" diam.; 30", 48" and 60" lengths x 1 1/2" diam.  
Three-Tube types 69" long x 1 1/2" diam. from stock.



## CONDENSERS

Fansteel stocks tantalum tapered tube condensers in 3" x 2" x 36",  
6" x 2" x 60" and 8" x 4" x 60" sizes.

**\*SEE THEM . . . BUY THEM AT BOOTH 617 CHEMICAL SHOW  
N. Y. COLISEUM—NOV. 30—DEC. 4, 1959**

Fansteel will have stocks of tantalum chemical equipment at the  
New York Chemical Show. Standard sizes on display will be available  
for sale, f.o.b. New York (or North Chicago) for your convenience.

Address inquiries to:

Equipment Department, Metals and Fabrication Division

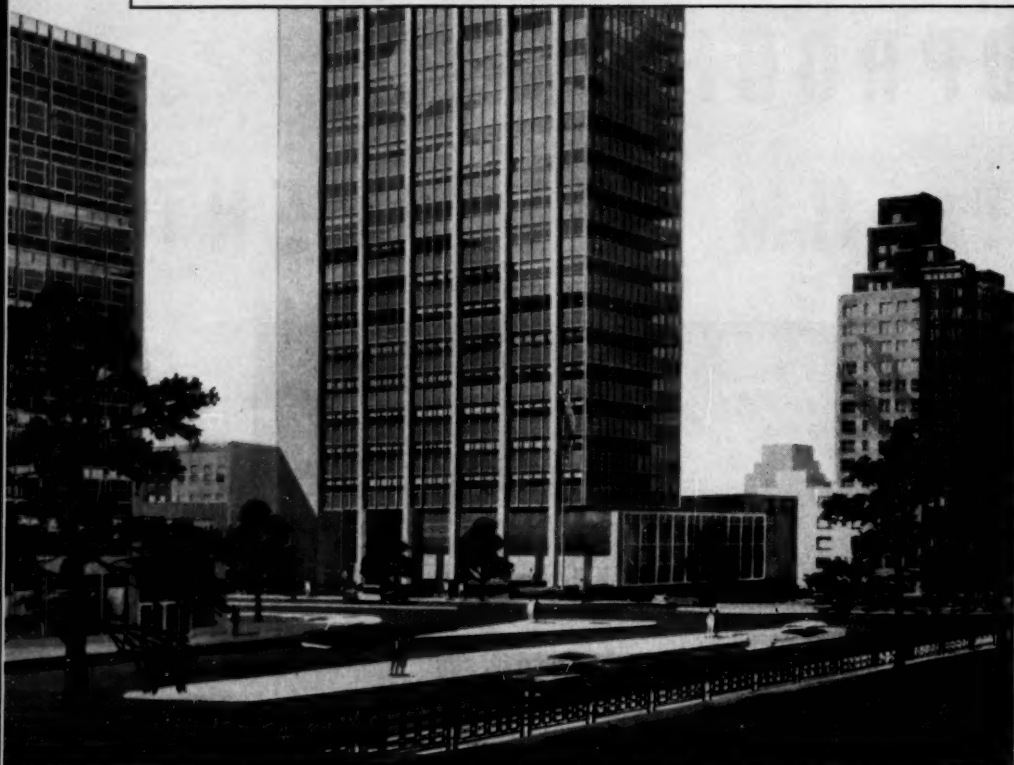
**FANSTEEL METALLURGICAL CORPORATION**  
NORTH CHICAGO, ILLINOIS, U.S.A.

G594

PRACTICE ...

## YOU & YOUR JOB

EDITED BY R. F. FREMED



UNITED ENGINEERING CENTER will be built on United Nations Plaza in New York.

## Hoover Breaks Ground for Engineers



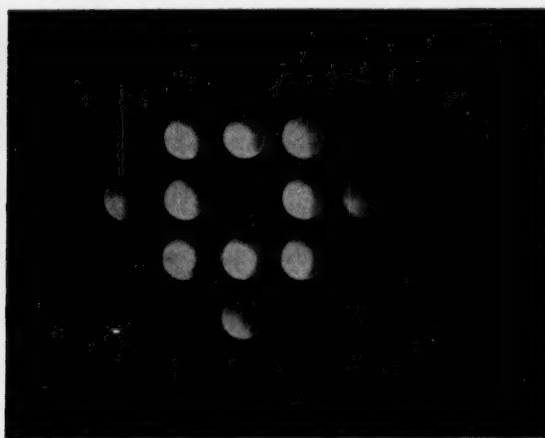
HON. HERBERT HOOVER speaks at groundbreaking ceremonies; at left on platform is chemical engineer D. L. Katz, president of AIChE.

Work begins on new structure that will house the representatives of more than 300,000 engineers.

"I have said before that the job of the engineer is to take from the scientists their discoveries and from the inventors their findings, and to apply them for the use of people everywhere. He makes a plan on paper. Then he moves to its realization. This is a high privilege among all professions.

"The purpose of this great building is to facilitate these

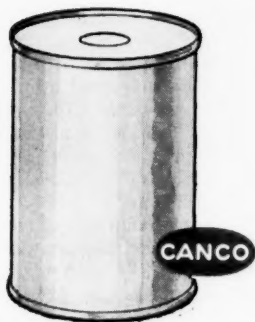
## TOMORROW'S CANNED FOODS MAY BE EVEN BETTER BECAUSE OF EXPERIMENTS WITH **NUCLEAR ENERGY**



This is an artist's rendition of an actual color photograph of an irradiation rack, illuminated solely by visible blue light from Cerenkov radiation.

**One experiment** calls for the exposure of frozen canned foods to gamma irradiation. This photo, taken at the Argonne National Laboratory, shows cans being placed in an insulating cylinder. The cylinder

will be sealed within one of the aluminum urns (at right), then lowered into the water of the radiation canal. There it is exposed to rays yielding from one to two million roentgens an hour.



High energy irradiation, alone or combined with thermal processing or freezing, shows interesting possibilities as a means for preserving packaged foods. To explore fully this new technique, American Can Company scientists are participating in an extensive irradiation research program.

Part of this work is carried on through cooperative projects at government and university laboratories, part through independent studies at Canco's multi-million-dollar Research Center in Barrington, Ill. As a result of this program, food for the nation's dinner tables some day may be sterilized by nuclear energy.

### AMERICAN CAN COMPANY



goals. It will play a great part in American life. It will serve all mankind."

Standing bareheaded against the winds and rains trapped betwixt hurricanes Gracie and Hannah, former President Hoover concluded his remarks with the phrases above and took a shovel in hand to break ground for the new 18-story United Engineering Center. When it

is completed in 1961, the building will overlook United Nations Plaza in New York City.

More than 500 invited guests braved the elements last month to witness this historic occasion. Perhaps the proudest among them were chemical engineers.

On groundbreaking day they were able to participate in the ceremonies fortified with the knowledge that individual chemi-

cal engineers—contributing towards the campaign conducted by the American Institute of Chemical Engineers—were the first to go over the top of their dollar-contribution quota.

AICHE had been asked to raise \$300,000, based on its proportional membership of the total for the five founder engineering societies. Of this amount, almost \$100,000 was raised by the special-gifts campaign directed by W. G. Whitman of MIT and S. D. Kirkpatrick of McGraw-Hill; and more than \$200,000 had been pledged through the efforts of hard-working local-section volunteers, and the headquarters staff under the able direction of D. L. Katz, president of AIChE and F. J. Van Antwerpen, executive secretary.

Just as June 1959 ticked off the calendar, AIChE was able to announce that it was the first engineering society to go over the top, with 100.1531% of its quota reached. It was an achievement of which all chemical engineers can be proud, whether members of the Institute or not, whether contributors to the fund or not.

For it means that the youngest of the five founder engineering societies is one of the most vigorous and alive.

In the new building, 18 American engineering groups will be housed. Together, these societies are responsible for many of the nation's technical publications, industrial standards and engineering conferences. They employ about 600 staff members and support the operation of the Engineering Societies Library and the Engineering Index, Inc.

In addition to office space, the \$12-million structure will also provide meeting rooms for 400 persons, plus smaller conference rooms for committees, an exhibit area and a cafeteria. The building will be owned and operated by the United Engineering Trustees, a group formed by the engineering societies for this purpose. UET now owns and operates the 52-year-old Engineering Societies Building on 39th St. in New York.

Construction commenced on October 15; Turner Construction Co., as general contractor, promises completion in 1961.



### Britain Trains Chemical Engineering Apprentices

In the United Kingdom today most of the larger industrial concerns run five-year apprenticeship programs to ensure a steady stream of skilled craftsmen. Shown above is an 18-year-

old, second-year apprentice in chemical engineering. During his training he will study all aspects of engineering both theoretical and practical. His probable final job: engineering draftsman.



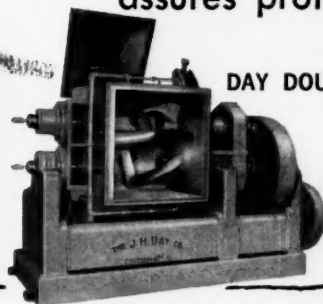
SEE OUR  
CHEMICAL SHOW  
EXHIBIT,  
BOOTH 121-122

For your processing needs...

advanced **DAY** equipment

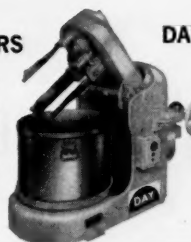
assures profitable performance!

for  
Mixing



**DAY DOUBLE ARM MIXERS**

Can't be beat for heavy-duty mixing of viscous fluids and semi-solids. Many types and capacities.



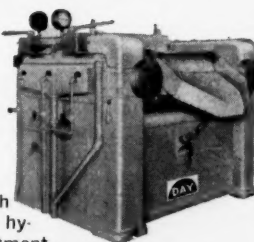
**DAY PONY MIXERS**

Are the peak of design for all change-can mixing of liquids, pastes, granulations. Single and twin motion models.

for  
Milling

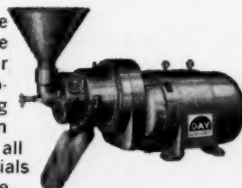
**DAY 3-ROLL MILLS**

Unsurpassed for fine dispersions of paints, inks, plastisols, ointments and many other heavy pastes and similar materials. Production and laboratory models with screw-type or advanced hydraulic roll pressure adjustment.

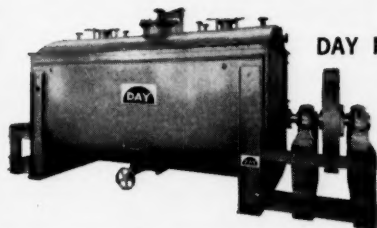


**DAY HY-R-SPEED MILLS**

They are the choice of the industry for grinding, homogenizing and blending, in one operation, all types of materials flowing or paste.

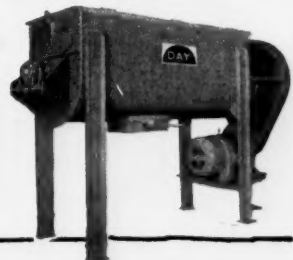


for  
Blending



**DAY RIBBON BLENDERS**

Produce perfect mixing of powders, pastes and liquids. The line is complete—light, medium, and heavy-duty designs.



for  
Sifting

**DAY RO-BALL SIFTERS**

With super-active ball cleaners, insure fast, thorough sifting of wet or dry materials. Models for 2, 3, 4 or 5 separations.



**CONSULT WITH DAY  
ON YOUR PROCESSING REQUIREMENTS**

Follow the lead of other major chemical processors and specify DAY equipment—accepted the world over for efficient, economical, dependable service. There is a DAY design that will meet your exact requirements for mixing, milling, blending and sifting operations. For detailed information on DAY equipment, call in a J. H. Day Company field engineer.

See our catalog in  
*Chemical Engineering Catalog.*

**USE THE DAY CUSTOMER SERVICE LABORATORY**



Our completely equipped laboratory, and staff of skilled technicians, are at your service to help you determine the best method of processing your product. This complete service is available without obligation.

**The J. H. DAY Co.**

Division of The Cleveland Automatic Machine Co.

Manufacturers of Quality Mixing, Blending,  
Sifting, Milling Equipment since 1887

4926 Beech Street, Cincinnati 12, Ohio

# Equipment Reliability vs. Cost

## . . . Strike a Balance for Maximum Economy

I. J. KARASSIK, Consulting Engineer and Manager of Planning, Worthington Corp., Harrison, N. J.

### Why Pumps Fail Early

#### • Faulty Design

Hydraulic inadequacy  
Mechanical inadequacy  
Inadequate choice of materials

#### • Faulty Components

Faulty or porous castings  
Errors in machining  
Errors in assembly

#### • Faulty Installation

Inadequate mounting on foundations  
Inadequate suction piping configuration  
Distorting piping stresses  
Inaccurate alignment

#### • Improper Operation

Inadequate cleaning of suction piping  
Inadequate warm-up when handling hot liquids  
Operation at abnormal flows  
Faulty operation of valving  
Inadequate supply of sealing fluid to stuffing boxes  
Improper choice or installation of packing  
Excessive lubrication or cooling of bearings

In examining equipment reliability, we find failures fall into three distinct categories: infant mortality, random failure and wear-out. In the first part of this series ("Increase Equipment Reliability by Studying Cause of Failure," *Chem. Eng.* Nov. 2, 1959, p. 112) these concepts were discussed in detail.

By making certain key assumptions, we classified wear-out and random failure as problems requiring only nominal attention.

We are left to deal with infant mortality. What, then, are the factors that contribute to early failure of process pumps?

### Infant Mortality

If we prepare a check-list of the potential hazards, we can first classify them into the following sub-groups:

- Faulty design
- Faulty components
- Faulty installation
- Improper operating procedures

Each of these sub-groups can be further broken up into a number of individual causes, as shown in the accompanying table.

Some authorities refuse to include faulty design or faulty components among the causes of infant mortality on the ground that these two categories of failures belong to a production phase preceding the "birth" of the equipment. But this is strictly a matter of semantics.

For our purposes, both causes

should be included in our considerations for a thorough analysis of reliability factors. That is, they should be listed, but we don't have to go into a detailed study of these causes here.

We must assume, on one hand, that the manufacturer seldom installs a completely untried piece of equipment for regular commercial operation. On the other hand, any selective analysis between several designs is made by an engineer capable of understanding and evaluating differences in design and material potential.

Similarly, faulty components should be, and generally are subject to elimination or at least major reduction through careful inspection.

### Find the Cause

The remaining sub-groups of infant mortality causes are well worth most thorough attention. In my estimation, they are the most frequent causes of pump difficulties.

To begin with, there's no suitable excuse for any failures caused either by excessive piping stresses which distort alignment in operation or by inaccurate field alignment. Such matters are readily subject to measurement and recheck.

The same can be said of suction piping configuration. Limitations of centrifugal pumps with regards to suction conditions are sufficiently known so

Put a Teflon® sleeve in the body



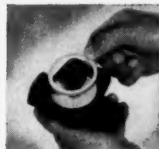
insert a plug



add a diaphragm,



a gasket



and a thrust

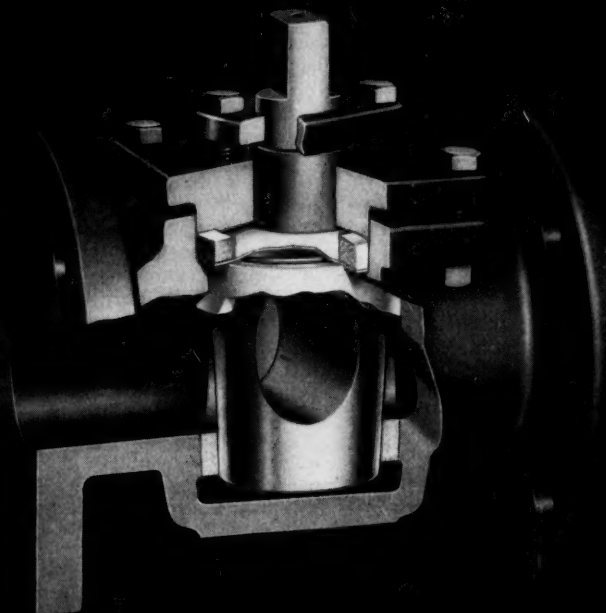
collar, secure the cap and the



self-aligning adjuster,

and you've got a non-lubricated, trouble-free plug valve.

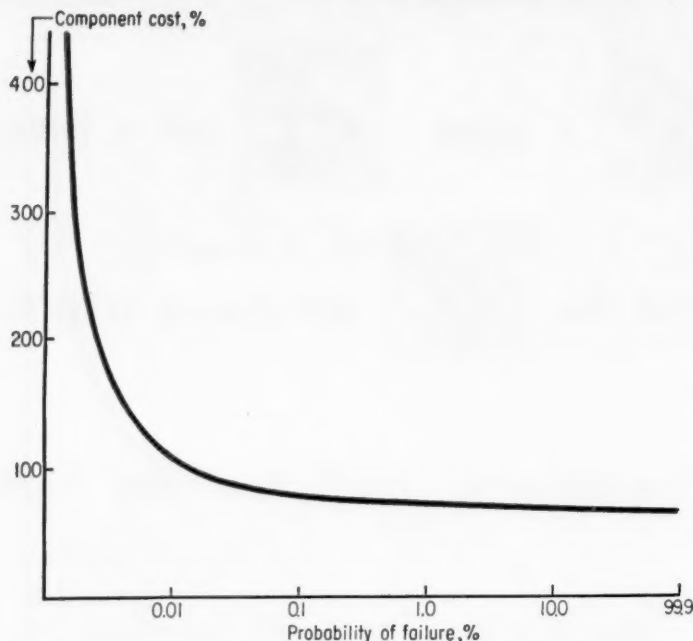
This is the new Type G **DURCO SLEEVELINE**



*ductile or stainless  
screwed or flanged  
1/2" to 2" sizes*

*ductile flanged  
sizes to 6"*

*150 psi rating  
write for Bulletin V/12*

**Increased Cost Doesn't Necessarily Increase Reliability**

that any design engineer is able to provide adequate suction conditions for any pump installation that's his responsibility.

As to proper pump and driver alignment, manufacturer's instruction books are generally quite explicit in methods to follow to obtain satisfactory installation. Here again, therefore, there is no excuse for taking short cuts that result in premature failure of bearings or even of the entire pump.

In the realm of improper operating procedures, I must single out inadequate cleaning of the suction piping and the equipment connected to it as a prime offender. Probably the most serious hazard to a centrifugal pump during its early life is the presence of foreign matter such as mill scale, welding spatter or brittle oxide particles that lodge in the close internal running clearances and causes major damage.

Operation of pumps at abnormal flows—either too reduced or too much in excess of design conditions—runs a close second in the list of centrifugal pump difficulties encountered.

Finally, improper operation of stuffing boxes and bearings is an area which merits close attention if excessive infant mortality is encountered in the centrifugal pumps installed in your plant.

Of course, it's impractical to present an exhaustive list of all the individual causes of centrifugal pump infant mortality. But, examination of a typical instruction book reveals a great many other causes beyond the ones listed here.

**Reliability vs. Economy**

We have demonstrated through this pump example that one of the most important considerations in selecting equipment is the reliability of this equipment and its ability to give a long life of uninterrupted service. But the equipment has still another characteristic: economy of operation.

There has always existed a tendency to give efficiency, that is, economy of operation, an equal or even greater weight than reliability. We must pause, therefore, and consider how justifiable are efficiency evaluations and

what factors must be examined before we can look at these evaluations in a proper light.

Again let's take the centrifugal pump for our example. There's no doubt, of course, that a pump with a higher efficiency consumes less power and has lower operating costs—at least on paper. But the fundamental fact that we must keep in mind is that the question of efficiency is inalterably linked with reliability. In general, the desire for higher efficiency and maximum reliability isn't always compatible.

For instance, one of the great sources of power losses in a centrifugal pump is the disk-hp. This is the power expended to drag the impellers through the liquid surrounding them. These losses increase with the fifth power of the impeller diameter. Therefore, power can be saved by reducing individual impeller diameters and the head produced by each impeller and by increasing, correspondingly, the number of stages.

This solution increases the shaft span of the pump and the shaft deflection. Unless we increase internal clearances to compensate for this increase, we reduce the reliability of the pump.

Another source of efficiency improvement lies in reducing internal clearances. Efficiency can be increased merely by reducing the pump's normal internal clearances. I need not comment on the effect of such a reduction on pump reliability—save to say that this reduction, unfortunately, cannot be given a quantitative evaluation as easily as the gain in efficiency and the savings in power consumption.

As a matter of fact, the evaluation of power costs is sometimes inconsistent when you consider the method used in selecting pump design conditions. These are generally determined by adding anywhere from 5 to 25% margin to the maximum expected capacity requirements. Then, after calculating static differential head and friction losses at this increased capacity, a further safety margin is added to the total head resulting from these calculations.

All this excess capacity and head is provided as a margin against pump wear as well as



EXPANSION JOINTS

# THEY STAY FLEXIBLE when handling the most severe chemicals

"U.S." Expansion Joints of  
butyl rubber construction are recommended  
for handling certain chemicals.

Typical of these are:

**ANILINE-R.T.**

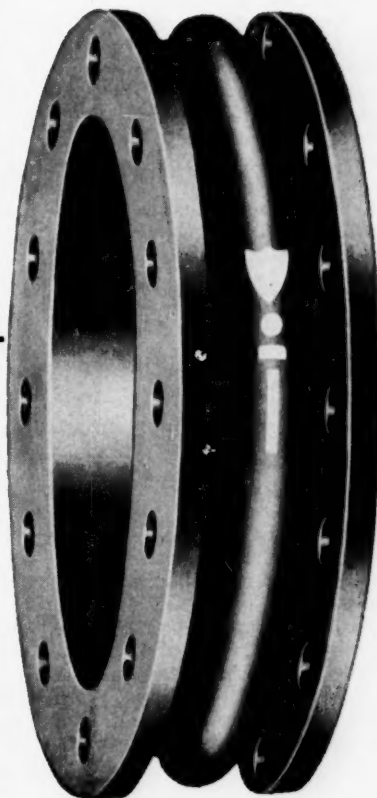
**DIETHYL SEBACATE-R.T.**

**HYDROCHLORIC ACID (37%) UP TO 122° F**

**SODIUM HYDROXIDE (20-50%) UP TO 158° F**

**SODIUM HYPOCHLORITE (20%) UP TO 158° F**

**SULFURIC ACID (50%) AT R.T.**



"U.S." Expansion Joints remain completely flexible at all times. Joints made of neoprene or natural rubber stiffen up, crack and fail when handling the above chemicals.

For the most severe service, specify "U.S." Expansion Joints lined with Teflon. These "U.S." Joints are ideal for handling most chemicals and solvents.

"U.S." Expansion Joints are in use in every kind of industry. Some of these joints have been on the job since 1924, the year "U.S." invented them! Long-lived, they *prolong the life* of equipment in pressure and vacuum systems.

. . .

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery, and quality industrial rubber products.



Mechanical Goods Division

## United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y.

In Canada: Dominion Rubber Company, Ltd.



against errors in estimating conditions of service. This is considered an absolute requisite for full reliability of the installation.

It seems a philosophy based on adding an arbitrary margin to the capacity and head requirements, while insisting on evaluating minute differences in the power consumption of various pump selections isn't sound. It's as false an approach to reality as engineering calculations that start with very approximate assumptions and use logarithms to yield an answer in five significant figures.

It is interesting to note that specifications which include efficiency evaluations frequently incorporate the statement "everything else being equal," power savings will be evaluated at so-and-so-many dollars/hp.

"Everything else being equal" is a phrase much overworked and frequently misused in the engineering vocabulary. It's so seldom you find a case where everything else can be equal when you compare designs based on entirely different conceptions. This expression could well be allowed to fall into oblivion.

### First Cost vs. Reliability

And what of first costs? This question in itself could serve as a subject of a separate paper—of several papers, as a matter of fact. But we can at least indicate a point of departure for such a study.

Let's limit ourselves to a strictly qualitative approach. Then, we can suggest that the shape of a curve showing the relationship between the cost of a piece of equipment and the probability of failure has the general characteristics of a hyperbola as shown on p. 212.

There is always a point where very minor savings result in a tremendous increase in the prob-

ability of failure. There also is a point at which any further reduction in this probability is achieved only at a cost increase which is hardly justifiable.

If you could really construct such a curve, choice of equipment would be a relatively simple matter. You could use any one of the two approaches. Maximum permissible probability of failure could be determined and, in turn, this determines the price you pay for the equipment in question. Alternative is to determine the maximum price you are willing to pay and to learn how to live with the resulting probability of failure.

Unfortunately, such curves only exist in our imaginations, at least for the present.

The next degree of refinement consists of asking ourselves whether such a curve is continuous. Very probably not, since we can immediately seize on an example of discontinuity.

Take the comparison of stainless steel casings for chemical pumps handling corrosive solutions. We find an increase in cost of some 50 to 75% reduces the probability of failure from almost a certainty to something infinitesimal. In other cases, the curve may be more continuous in character: added costs of more thorough inspection improve reliability in a continuous relationship.

Whatever the exact nature of this relationship, the general shape of the curve teaches us the futility of buying too cheap or too dearly.

### What Can You Do?

The question arises: since it's difficult to assign a quantitative significance to reliability, how can this characteristic be evaluated? How are we to judge and choose between two or more pieces of equipment, ostensibly designed to perform the same function with the same degree of satisfaction?

Can we assign any specific value to differences—claimed or real—which distinguish between two methods of accomplishing a given function?

Before I answer this question, let me remind you that in your private life you constantly do just that. You evaluate intang-

ibles each time you buy a house, a car, a suit or even a tie. You choose without the benefit of quantitative analysis when you select a piece of furniture for your living room, the resort to spend your vacation or the career you will devote your life to.

We engineers are faced with constant decisions, required to justify our every action, destined to make numberless errors and beset with difficulties at every turn. How easy, then, to surrender our right to make these decisions to a tabulation of symbols inscribed in black ink on an innocent piece of white paper. To make the mute testimony of numbers responsible for all our conclusions. To blame the errors on some mysterious inconsistency between these numbers and the actual facts. And to shrug off the difficulties onto whatever or whoever lacks the protection of other numbers, other equations and other dry statistics.

I refuse to accept this as an explanation of the common preference for a cold-blooded evaluation of dollars and hp., with little or no regard for the evaluation of less tangible equipment characteristics.

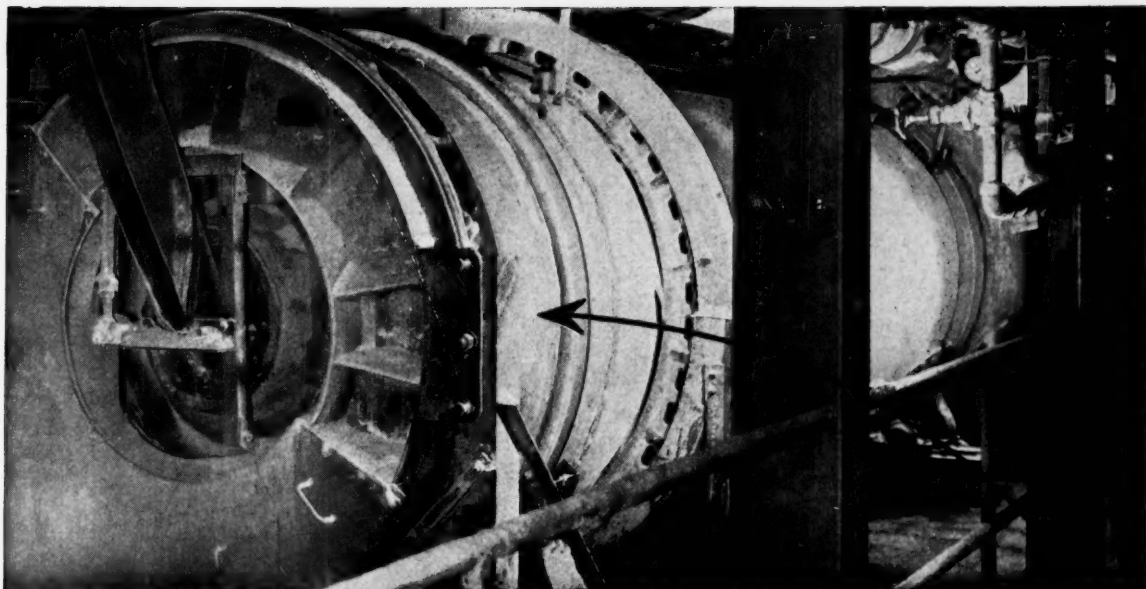
I prefer to believe that if some engineers fail to take into account or even to recognize these less tangible characteristics, it's merely because they aren't adequately equipped for this task. It is because those of us whose duty it is to educate others in this recognition process have, in some cases, failed to accomplish what we set out to do.

If the thoughts expressed on these pages in some measure focus attention on the important factors affecting an evaluation of reliability, then we will have served some small purpose.

I can hear someone say I haven't answered all the questions raised. Decidedly and knowingly I have not. I set myself the task of exploring the little known and seldom discussed phases of these problems and made it my responsibility to ask these questions, not to answer them.

**Part I on types and causes of failure appeared Nov. 2.**

IGOR J. KARASSIK is Consulting Engineer and Manager of Planning for the Harrison Div. of the Worthington Corp. He holds both BS and MS degrees from Carnegie Tech. Karassik joined Worthington in 1934 and since 1936 has specialized in multistage high-pressure pumps.



better than crystals and higher output were realized when a leading chemical producer installed this Link-Belt Roto-Louvre dryer at their northern Ohio plant. Uniform aeration and controlled

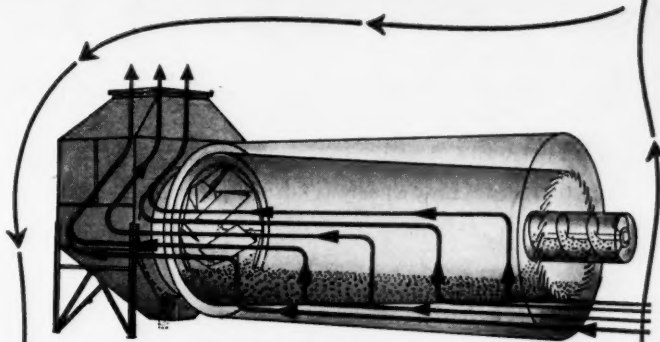
gradual drying strengthens crystal structure, resulting in more pleasing appearance. Gentle handling eliminated crystal degradation.

## Repeat laboratory precision in full-scale production

### with the **LINK-BELT** Roto-Louvre dryer

**Y**ES, it's easy to duplicate the quality of laboratory test samples on production runs using a Link-Belt Roto-Louvre dryer. Accurate "scale-up" is readily achieved because of Roto-Louvre's unique design and precisely controlled drying.

Compact and highly effective, this machine introduces dry, heated air through ever-changing channels, exposing the entire surface of every particle to uniform treatment. For facts, send for Book 2511. Or, if you prefer, send a sample of your material and we'll work out drying, cooling or roasting procedures you can duplicate in your own plant.



### Common-sense design assures effective heat transfer

Roto-Louvre has largest volume of air penetrating thin bed of material near feed end, where greatest evaporation must take place. As material moves forward and bed becomes thicker, smaller air passages reduce vol-

ume of air passing through bed, preventing overheating. Precise control of input air temperature, exhaust and conditions of material travel assures maximum heat transfer per cubic foot of air.

# LINK-BELT

DRYERS • COOLERS • ROASTERS

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,564

**LINK-BELT COMPANY**  
Prudential Plaza, Chicago 1, Ill.

Please send me 20-page Roto-Louvre Book 2511.

Name .....

Firm .....

Address .....

City..... Zone... State.....



PRACTICE ...

## CORROSION FORUM

EDITED BY R. B. NORDEN



STRUCTURAL, fireproofed wood is going into plant construction with insurance companies' blessings.

## Wood Gains Rating as "Noncombustible"

Insurance companies now recognize wood impregnated with fire-retardant chemicals as fireproof. Producers claim treated wood is superior to structural steel in plant construction.

Wood, as a structural material, is not a big factor in process plants. And for a good reason—ordinary, untreated lumber is a fire hazard.

But don't sell wood short. Spe-

cially treated "fireproofed" wood is making a strong bid for a large share of this plant construction market. In fact, a number of wood processors—ordinarily a very conservative group—

are claiming that wood, pressure-impregnated with fire-retardant chemicals is superior to structural steel. They say treated wood is cheaper, more resistant to fire, easier to fabricate and

# HAYNES

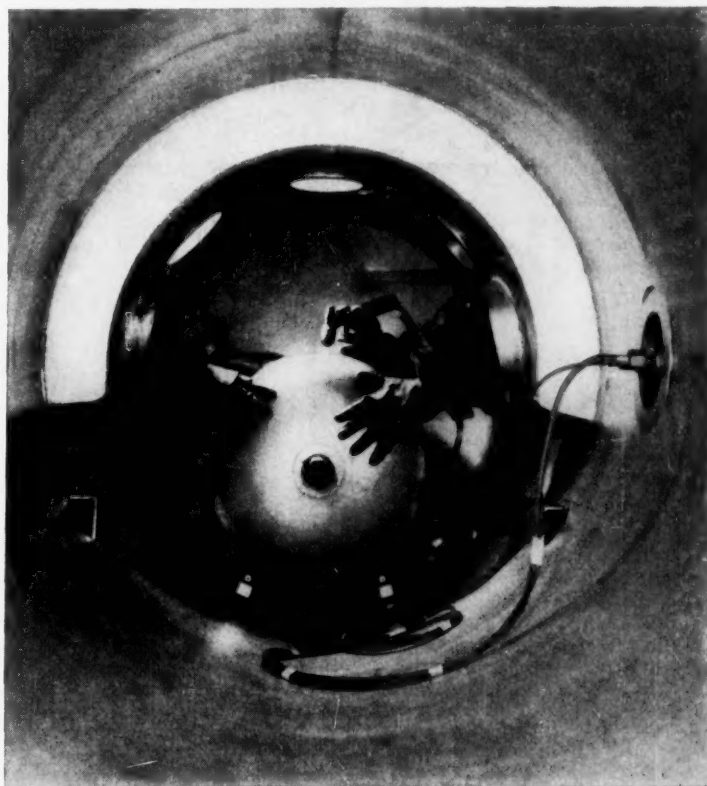
ALLOYS



## RESEARCH REPORTS

Developing new metals and improving current ones to combat the devastating effects of high heat, corrosion, erosion, and abrasion, are the primary objectives of the advanced Research and Development Laboratories at Haynes Stellite Company. HAYNES Tantalum, described below, is one of their more recent achievements. Others will be described in future Research Reports.

Design engineers, metallurgists, and physicists may see in these new metals and alloys opportunities for a breakthrough in applications where limited properties of other metals have presented obstacles. Our research scientists, engineers, and technicians will gladly help you discover whether they can help improve your products.



### HAYNES Tantalum

Close to 100 % pure, chemically. It is produced by the consumable-electrode process. Practically inert to a wide variety of corrosive media, with these added advantages: *Wide* sheets with improved welding characteristics, making it easier to use in chemical and pharmaceutical equipment where corrosion and product contamination must be minimum. Pictured is tantalum reactor liner being welded inside tank of inert gas.



**LARGEST Tantalum  
Lined Reactor**

An outstanding example of what can be accomplished with the greater sheet width and improved welding characteristics of HAYNES Tantalum is shown above. The vessel—the largest tantalum-lined reactor ever constructed—is a 30-gallon unit designed to operate at 630 deg. F. and 500 psi. Every part that will be exposed to corrosives, including the agitator, is made, or sheathed with, HAYNES Tantalum. For full details on this new material, write for descriptive booklet.

# HAYNES

ALLOYS

**HAYNES STELLITE COMPANY**

Division of Union Carbide Corporation  
Kokomo, Indiana

**UNION  
CARBIDE**

Address inquiries to Haynes Stellite Company, 420 Lexington Ave., New York 17, N. Y.

"Haynes," "Haynes Stellite," and "Union Carbide" are registered trade-marks of Union Carbide Corporation



more resistant to corrosive fumes than steel.

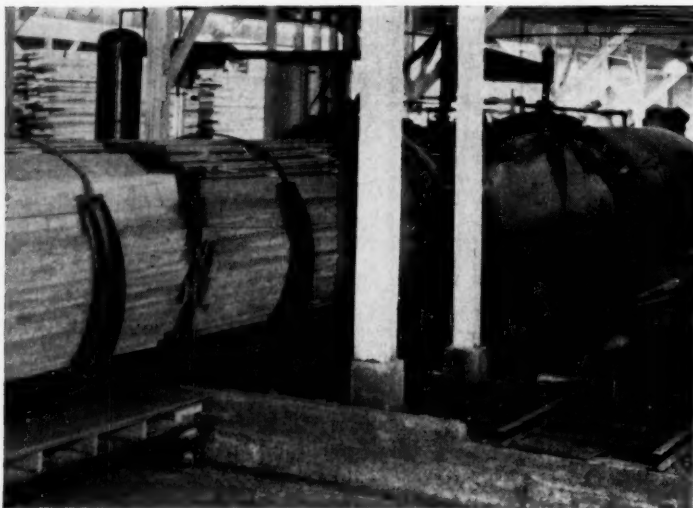
► **Better Than Steel?**—As structural members, this wood is going into storage and maintenance buildings, cooling towers, filter frames, resilient flooring, catwalks where sparking haz-

ards are a problem, and exhaust ducts.

Actually fire-retardant (or fireproofed) wood which chars but reduces and delays the spread of fire is not new, although techniques and formulations have been recently improved.

The important point is that many fire-rating insurance companies are recognizing treated wood as something besides ordinary lumber. Insurance rates on commercial wood construction, particularly buildings, used to be extremely high, and there was

## How to Make Wood Fireproof: Step-by-Step



**PRESSURE impregnation, at 50 to 250 psi., with fire-retardant chemicals.**

Typical wood fireproofing procedure involves a treatment solution of ammonium salts and boron compounds.

This is prepared in a 5,000-gal. steel tank equipped with steam coils and a centrifugal pump for circulation. Mixing is not difficult since all chemicals are soluble in water. Heating the water, however, makes it easier to dissolve the boron compounds.

Chemicals are dumped manually from bags into the mixing tank containing 130-140 F. water. Solution is stored in three upright cylindrical steel tanks, each holding 25,000 gal., and equipped with steam coils for heating.

Treating is done in a horizontal steel cylinder: 6 ft. in diameter and 75 ft. long with a hydraulically operated quick closing door at the front end. Shell wall is  $\frac{3}{4}$  in. thick. A narrow gage track runs the length of the cylinder. Beneath this track there's a steam coil consisting of a bank of pipes for heating the chemical treating solution.

Trams carry the lumber into the treating cylinder on the narrow

gage track. The longest single timbers treated so far have been 42 ft long.

Loaded trams on the track are pulled into the treating cylinder by a motorized winch. Loading and unloading call for extra help. Otherwise, a single operator runs the entire treating plant.

When the load is in the cylinder, the quick-closing door is shut and locked.

Next, a vacuum is produced inside the treating cylinder to de-aerate the wood. A motor-driven vacuum pump exhausts the treating cylinder. It produces a vacuum of 26 to 27 in. of Hg, maintained for about 1 hr.

Then the cylinder is filled with 11,000 to 12,000 gal. of the treating solution, depending on displacement of the lumber. This is done while the cylinder is still under vacuum to keep out entrained air.

It takes about 10 min. to fill the cylinder. A high-capacity centrifugal pump, handling 600 to 700 gal./min. through 6-in. lines, is used for filling and emptying the treating cylinder. Since wood does not

take up individual chemicals selectively from the treating solution, excess solution remaining after treatment can be re-cycled to the storage tanks to be used again on another batch of wood.

After the cylinder has been filled, more solution is pumped into it. Since the water solution of the treating chemicals is essentially incompressible, the only place the solution can go is into the wood. Pumping in the additional solution builds up a hydrostatic pressure of 50 to 250 psi. A pressure pump controlled by an electric pressure switch is used for this purpose.

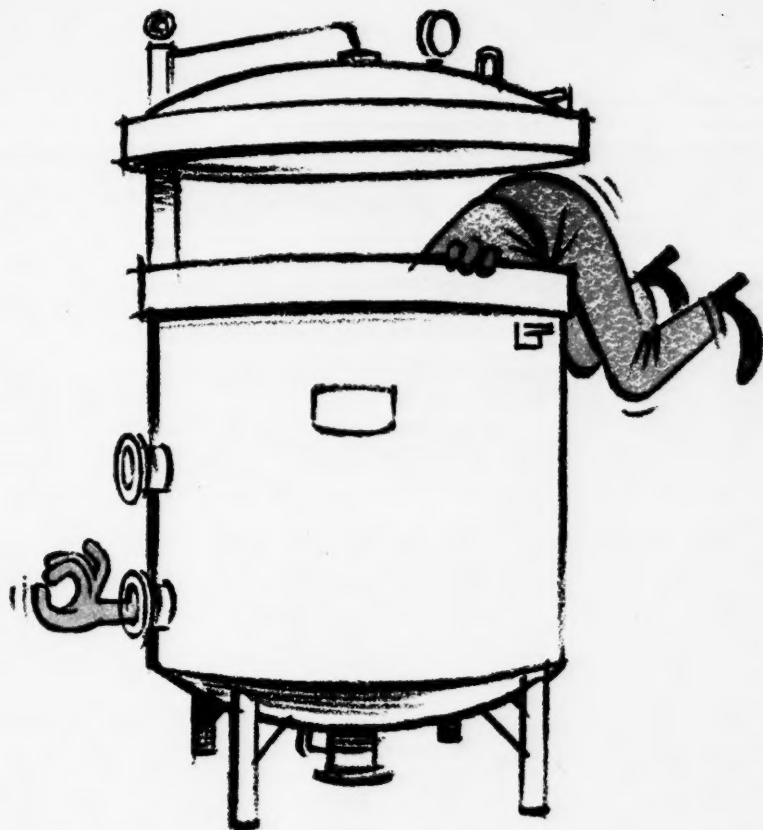
How much pressure is required for effective treatment depends on the species of wood and how much retention is required. Wood such as Douglas fir, yellow pine, hemlock and spruce, which are technically soft woods, and which are now authorized for structural use if properly treated, usually call for less pressure than hardwoods such as maple, birch, red oak and walnut. Those hardwoods are used principally for interior finishes.

Heat is also essential for penetration of the chemicals into the wood. How long the lumber is kept in the treating solution also depends on the species of wood and required retention. For soft woods, average treating period is usually from 12 to 14 hr. Lumber can be left in the treating solution overnight and longer if necessary.

The operator controls the entire treating process, following its progress on an instrument panel. Besides the electric Mercoild pressure switch for the pressure pump, the panel is also equipped with a temperature-pressure recorder, visual temperature and vacuum-pressure instruments, and a separate manometer.

When treatment has been completed, solution is pumped out of the cylinder, the door is opened, and the loaded trams of freshly impregnated fire-retardant wood pulled out. After air-seasoning on sticks in the yard, the treated wood is ready for shipment.





# A FILTER WORTH LOOKING INTO

You have to look "under the hood" of a Durco-Enzinger filter to really appreciate some of the engineering and design advantages that you get. For example, are you familiar with these **exclusive** Durco-Enzinger features and how they can help you solve your filtration problems?

- Finger leaf spacers
- Wingwheel closure
- Tilting leaves
- Oscillating sluice
- Traveling sluice
- Cake thickness detector

Couple all these with a good basic pressure leaf filter design, ASME code construction, rugged leaves and real filtration know-how, and you surely have a filter worth looking to. Write for bulletin EF/2a.



ENZINGER DIVISION

**THE DURIRON COMPANY, INC.,** Dayton, Ohio / Filters • Valves • Pumps • Process Equipment

little distinction made between treated and untreated wood. This picture has radically changed:

- Some properly treated woods now have an Underwriters' flame-spread rating of 15—essentially a noncombustible material of construction. Ratings differ somewhat depending on treatment and type of wood.

- Western Actuarial Rating Bureau has assigned noncombustible insurance rates to the material as a roof support.

- Factory Mutual and Factory Insurance Association have approved fire-protected wood as a noncombustible material without any restrictions.

- The N. Y. City building code now permits direct substitution of fireproofed wood for metal in one-story industrial buildings having a maximum of 15,000 sq. ft. of floor space.\*

► **Who's Doing What**—There are two big names in this field: Koppers Co., Pittsburgh, Pa., and Protexol Corp., Kenilworth, N. J. Both have been working on formulations and techniques for a long time, but lack of good standards plus treatment costs which were not offset by compensating insurance and amortization savings held them back. Now standards are available and insurance rates are coming down.

A number of chemical formulations have been developed by the two companies. And each licenses many lumber companies in the U. S.

Essentially any of four types of formulations (all prevent wood decay as well as retard fire) are pressure impregnated into wood:

- Chromated zinc chloride; offered by Koppers and Protexol.

- Chromated zinc chloride; with some ammonium sulfate and boric acid; offered by Koppers.

- Ammonium sulfate, diammonium phosphate, sodium tetraborate and boric acid; called Minilith by Koppers.

- Chromated zinc chloride, ammonium sulfate, boric acid; called Pyresote by Protexol. In addition Protexol makes essentially clear, straight ammonium

\*Treated wood is not new to the code. It's had a long standing requirement that any wood in large buildings has to be fireproofed.

sulfate formulations which do not prevent wood decay.

- A new, as yet undisclosed formulation, called Non-Com by Koppers, which has received a lot of attention from insurance companies.

► **Some Limitations** — These treatments are not cheap. Many add about 50% to the cost and about 5% to the weight of wood. Nevertheless, cost of a treated-wood construction job is lower than structural steel.

But the wood has to be cut with carbide-tipped tools (the salts in the wood quickly dull ordinary saws and cutting blades).

And the fire-retardant chemicals are water soluble. This big disadvantage can rule out use of treated wood outdoors. Shellac and paint can stop leaching, but such a coating must be very carefully maintained.

► **Wooden Warehouse** — One company, Cross, Austin & Ireland Lumber Co., Brooklyn, N. Y., working with Koppers chemicals, claims a fireproofed wood warehouse (wood skeleton sheathed with aluminum siding and roofing) is 10¢ to 15¢/sq. ft. less than comparable steel construction.

Insurance rates will be \$1.05/\$1,000 compared with \$1.15/\$1,000 for steel in N. Y. And Cross, Austin also claims that treated wood, while it will char, will stand up better than steel in a burning building (steel loses strength at 1,000 F., while a fire in a burning building can raise temperatures to 1,300 F.), minimizing the danger of a building collapse.

► **How Chemicals Work**—Theories vary on just how the fireproofing salts work. But roughly the progressive action goes like this:

Some of the salts break down at low temperatures giving off nonflammable, nontoxic gases which act as a protective blanket and inhibit flame propagation at the surface.

Intense heat causes the salts to decompose. This results in absorption of heat which cools and in some cases even extinguishes the igniting flame.

The formation of a layer of dense, modified charcoal acts as

an insulator and doesn't allow exposure of inner wood through the large fissures found in normal char.

Some components of the fire-retardant melt and eventually fuse over the wood fibers, forming a glaze impervious to air and oxygen.

There is no doubt, regardless of whether this theory is correct, that fireproofed wood works. And a large, new market should be opening up for this long-neglected material of construction.

## High Strengths Boost Aluminum Rocket Casings

High-strength aluminum looks very good for solid-propellant rocket-motor casings, according to Alcoa.

All-aluminum cases have recorded yield strengths greater than high-strength steels. Hydrostatic testing of light metal cases made of 7178-T6, a very strong commercial aluminum alloy, showed yield strengths equivalent to 224,000-psi. steel. Top yield strength of commercially available steel is around 200,000 psi.

The one-piece aluminum cases were fabricated by a combination of forging, extruding, sizing and machining steps. Improvements in the process, plus new high-strength aluminum alloys now being evaluated, are expected to produce rocket motor cases with yield strength equivalent to 255,000 psi. in steel.

This will be more than enough to meet stringent requirements (equivalent yield strength in the range 210,000-240,000 psi.) for rocket engines now being developed. Such weapons as the underwater-launched Polaris and the all-purpose Minuteman will be driven by thrust from rocket motors fueled by solid propellants.

In another approach to the problem, Alcoa has fabricated cases wrapped with fine, high-strength aluminum wire. The strength-to-weight ratio exhibited by these cases has surpassed the magic million-in. mark sought for rocket motor case applications.



USCOLITE PLASTIC PIPE



## CONFUSED ABOUT PLASTIC PIPE? (MOST EVERYONE IS)

Here's your guide:

**U. S. Uscolite® CP acrylonitrile-butadiene-styrene copolymer (ABS-I) pipe** is best where maximum resistance to impact is demanded. It will safely handle most chemicals of industrial importance at working temperatures up to 170°F. This is the major plastic pipe used by chemical processing industries.

**U. S. Uscolite RV polyvinyl chloride (PVC-I) pipe** is best for extremely active oxidizing agents such as strong sulphuric, nitric and chromic acids. This unplasticized, unmodified Type I PVC has high impact strength and handles temperatures up to 140°F, far in excess of normal requirements.

**Uscolite HT (ABS-II) pipe** is a new addition to the resin-rubber compounds. HT stands for exceptionally High Tensile qualities, plus much better retention of physical properties at High Temperatures.

These types of Uscolite Pipe cover all requirements, not only because they are virtually immune to internal and external corrosion, but they are non-contaminating, odorless,

impart no taste or discoloration. Because of these qualities they are approved by the National Sanitation Foundation for carrying drinking water. The use of Uscolite results in a saving of appreciable dollars in installation costs and reduction in man-hours. The skills to install metal pipe are not required to install Uscolite. Assembly can be accomplished in half the time. *Not one foot of Uscolite Pipe has ever failed in service when used in accordance with our recommendations.*

A fourth pipe, **UscoFlow HT (ABS-II)** is a black utility pipe, especially suitable where low first costs are a factor. It's a blend of styrene-base resin and synthetic rubber for good impact resistance and high tensile strength. UscoFlow is the ideal answer to builders and large developers who are seeking long-lived, maintenance-free pipe for plumbing.

We invite detailed inquiries or call your "U. S." plastics distributor. He has the *largest* line of plastic pipe and fittings, plus an experienced background to settle any and all questions about which pipe to use.



Mechanical Goods Division

# United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N. Y.

In Canada: Dominion Rubber Company, Ltd.

...in wet dust control

## NEW DUCON DYNAMIC WASHERS

**RECOVER DIFFICULT DUSTS  
EFFICIENTLY AND ECONOMICALLY**

Ducon UW-4 Dynamic Wet Dust Collectors have added a new dimension in dust recovery. They have replaced, with outstanding success, many more costly and less effective dust collectors in the recovery of "difficult" materials, such as fine and abrasive dusts in kilns, rotary driers and other applications.

The UW-4 Washers are also ideal for high loading conditions where maximum efficiency is desired.

Ducon UW-4 washers offer other unique advantages, including constant air capacity, low water consumption and rugged construction. They are self-cleaning and fire and explosion proof.

*For complete information write for Bulletin W-7456.*

**THE Ducon COMPANY INC.**  
147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK



the  
name in  
DUst  
Control

Canadian Branch:  
**THE DUCON COMPANY of CANADA, Ltd.,**  
1131 Pettit St., BURLINGTON, ONTARIO

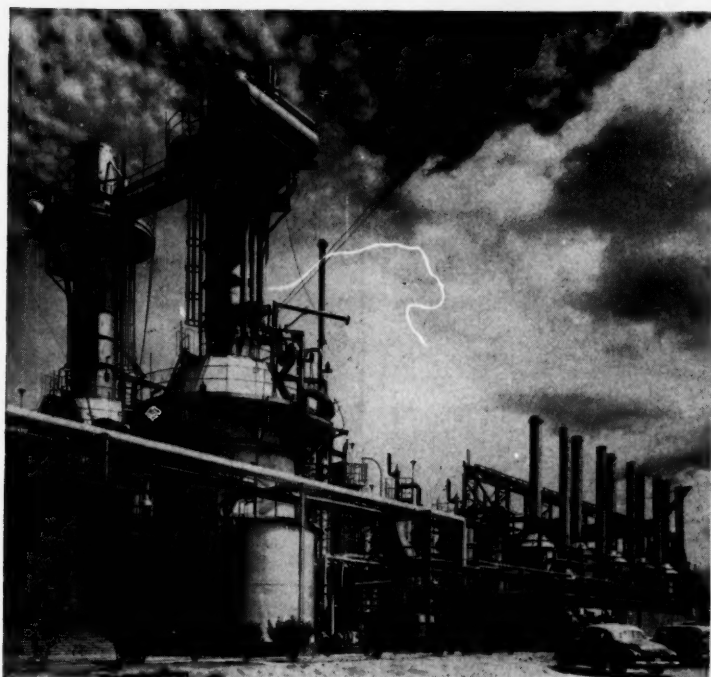
CYCLONES • CENTRIFUGAL WASH COLLECTORS • TUBULAR CLOTH FILTERS • DUST VALVES



## FIRMS IN THE NEWS

J. A. KING

### NEW FACILITIES



#### Reformed Natural Gas Successfully Reduces Iron Ore

M. W. Kellogg Co. reports successful operation of the 200-ton/day direct-reduction pilot unit at Monterrey, Mexico. New plant, owned and operated by Fierro Esponja, has produced more than 100,000 tons of sponge iron from magnetite and hematite ores since the beginning of the year. New HyL process, developed by Kellogg and Hojalata & Lamina, has scored high; plant operates at 91% efficiency. HyL process consists of direct reduction of ores by hot, reformed natural gas, supplied by twin gas reforming furnaces shown above.

American Smelting & Refining Co. announces plans for construction of a 15,000-ton/day copper flotation concentrator at its Mission Project in Tucson, Ariz. Project, to cost more than \$40-million, will

handle 5.4-million tons/yr. of ore and will produce 45,000 tons/yr. of copper.

Union Carbide Metals Co. reveals plans for production of calcium carbide at its Sheffield, Ala., plant. Existing submerged-arc electric smelting furnace will be converted for calcium carbide production by mid-1960.

National Starch and Chemical Corp. has begun expansion of its Alexander Research Laboratories in Plainfield, N. J. National Starch thus plans to increase its research efforts in its reach for new products.

American Metal Climax, Inc. announces plans for construction of a new germanium refinery at Carteret, N. J. New



... in dry  
dust control

HIGH EFFICIENCY

**DUCLONES®**

assure maximum recovery  
at lowest cost

DUCLONES—Ducon high efficiency cyclones—are designed and constructed for high recovery efficiency and low gas resistance. Their sturdy construction assures long, continuous service with a minimum of maintenance.

The exceptional performance of Duclones collectors is the result of these 6 unique features:

1. Small Diameter produces high efficiency
2. Helical Roof provides a turbulence-free path for the entering gas stream
3. Steep Cone improves dust separation
4. Dust Trap assures efficient dust removal from the cone
5. Vortex Shield prevents re-entrainment of dust in upward gas vortex
6. Scroll Outlet provides a low resistance clean gas outlet

See us at Booth 990



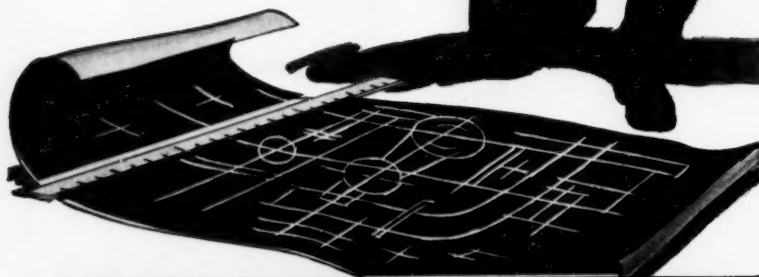
the  
name in  
DUST  
Control

THE

**Ducon** COMPANY, INC.

147 EAST SECOND STREET • MINEOLA, L. I., NEW YORK

# Is vacuum your problem?



Here's the solution to a big one — —

— Graham Twin Two Stage Non-Condensing Ejector handling 38,000 pounds per hour of non-condensibles at 2" hg. abs. pressure (124,000 CFM).

Graham offers you over a quarter century of experience in building ejectors from one to seven stages in every conceivable combination.

Let us help you with your vacuum problems. Factory trained engineers are available in these cities:

Baltimore, Md.	Miami, Fla.
Boston, Mass.	Minneapolis, Minn.
Buffalo, N. Y.	Mobile, Ala.
Chicago, Ill.	Philadelphia, Pa.
Cincinnati, O.	Pittsburgh, Pa.
Cleveland, O.	Richmond, Va.
Denver, Colo.	Roanoke, Va.
Detroit, Mich.	San Francisco, Calif.
Houston, Tex.	Santurce, Puerto Rico
Kansas City, Mo.	Seattle, Wash.
Los Angeles, Calif.	St. Louis, Mo.
Mexico, D.F., Mex.	Toronto, Ont.
	Tulsa, Okla.



**GRAHAM MANUFACTURING CO., INC.**

**Heliflow Corporation**

170 GREAT NECK ROAD, GREAT NECK, N. Y.

Factory: Batavia, N.Y. Other Graham precision-built products: Steam Jet Ejectors, Monobolt Heat Exchangers, Deaerating Heaters, Surface and Barometric Condensers, Steam Vacuum Refrigeration, Aquamizer Evaporative Condensers.

## FIRMS . . .

plant will produce germanium dioxide from scrap as well as ores, will be located at the Carteret plant of United States Metals Refining Co.

**Chemetron Corp.** is building a plant at Gibbstown, N. J., to recover 155 tons/day of carbon dioxide from ammonia. Liquid and solid (dry ice) product will be marketed to food, rubber, paint, aviation and metal industries; E. I. duPont will supply ammonia feed gas.

**Fluor Corp.** will perform design and engineering aspects of the U. S. Department of Interior's saline-water conversion plant at Point Loma, San Diego, Calif. New plant will employ multistage flash distillation to convert salt water into 1-million gal./day of fresh water.

**Phillips Petroleum Co.** reveals plans for construction of a multimillion dollar carbon-black plant in the Gulf-Coast area. Phillips declines to tell exact location of proposed plant.

**Pan American Sulfur Co.** has placed on stream its new liquid sulfur loading facility at Tampa, Fla., to supply low-ash, zero-moisture sulfur to Florida's west-coast fertilizer producers. Early next year, when the dry bulk loading terminal is completed, PASCO will maintain a 50,000-ton inventory to assure quick emergency service to its customers.

**Metal & Thermit Corp.** will build a ceramic chemicals plant at Monterrey, Mexico. New plant, to be operated by Industrias Metal & Thermit De Mexico, S. A., will produce chemicals to opacify ceramics for use in tile manufacture.

**Alberta, Oxygen & Acetylene Co., Ltd.**, subsidiary of Chemetron Corp., has just placed on stream new oxygen, nitrogen and acetylene producing units at Edmonton, Alta. Growth in demand by steel, metal-working, petroleum and chem-

ical industries has spurred the expansion.

**Associated Chemicals Co.** has completed construction of a 10,000-ton/yr. alum plant in Pomona, Calif. New plant is first in Associated's sequence of expansion projects to specialize in the inorganic chemicals field.

**Ford Motor Co.** announces plans to expand its Nashville, Tenn., glass plant to double its glass melting capacity. Nashville plant, built two years ago, now melts, fabricates and polishes 400 tons/day of glass for automotive application.

**U. S. Industrial Chemicals Co.** is again expanding its Houston, Tex., polyethylene plant, this time to 100,000 tons/yr. capacity. Expansion, to be completed by mid-1960, will up USI's polyethylene capacity to 150,000 tons/yr.

**Socony Mobile Oil Co.** has opened its Princeton, N. J., nuclear research center. Included in research projects at Princeton will be use of radiation in catalysts; a 2-million-electron-volt accelerator will provide electron, proton, and X-ray sources for research.



**Esso Research & Engineering Co.** has formed a new Mechanical Division, consisting of some 300 engineers to provide development, design, engineering and construction services to Esso.

**Crane Co.,** Chicago, Ill., has acquired the assets of the Chapman Valve Manufacturing Co. of Springfield, Mass. Crane thus re-establishes its position as an eastern-U.S. manufacturer.

**Brown Co.,** Berlin, N. H., has acquired a controlling interest

# WATER IS VITAL to your job and future!

The demand for industrial water will all but double in the next 18 years. With 40% of our communities now facing water shortage problems, approximately two of every five persons will be directly affected at work.

## Magazine Editors Voice Concern...

**Chemical Engineering** featured the water shortage problem in their December 1957 issue; **Plant Engineering** ran a feature on water conservation in February 1958; **Chemical & Engineering News** in their March 24, 1958, issue headlined a feature story, *Needed: An Extra 250 Billion Gallons of Water a Day by 1975*.

In May, 1958, **Water Works Engineering** had a story entitled, *There Is Enough Water — if We Conserve It!* It was followed by another article, *For Lack of Enough Water, Industries Can Be Lost*. **Chemical Engineering Progress** in January 1958, covered one phase of conservation in their *Water Reservoir Evaporation Control*.

In its September 29, 1958 issue, **Steel** asked, *Water, Water Everywhere?* and came up with the answer, "No!" It forecasts the expense of industrial water will more than double by 1975.

## ... Municipal Water Rates Going Up

**American City** in its January, 1959 issue started a survey of *Modern Water Rates*. Here are a few of the rates charged per 1000 gallons for large volume users: Ames, Iowa — 42¢; Blytheville, Ark. — 13¢; Brunswick, Ga. — 11½¢; Buhl, Idaho — 6¢; Dowagiac, Mich. — 9½¢; Hemet, Calif. — 12¢; Houlton, Maine — 10½¢; Jackson, Tenn. — 12¢; Laconia, N. H. — 13¢; North Andover, Mass. — 17¢.

The above rates are based on the minimum charge made for water and do not include any of the extras that may apply in the city cited. For example, some areas charge extra for customer-owned fire hydrants, fire lines, and sprinkler heads. Thus, a normal plant in these

areas will actually pay more for their water than the minimum rate shown above. Also, all rates are on a sliding scale, so the average rate will be slightly higher than that indicated.

## Industry Must Face the Facts...

By 1975, the chances are good that more than 20% of capital investment in a plant will be spent on water. Included in this estimate are: source development, delivery, treatment, piping and waste disposal. Already the mythical rate of 10¢ per 1000 gallons, which Industry considers a maximum charge, is a thing of the past.

## ... Recirculation Offers Many Advantages

Possibly the most promising way of keeping your water costs down is through recirculation. Many plants have turned to this method for numerous reasons:

- Total water used sharply reduced.
- Waste must be cleaned up before discharging, so there's little additional treatment required for re-use.
- Heat formerly lost is reclaimed.
- Less lost-production time due to water failure.
- Makes for good community and area relations.
- Provides a ready supply of water for fire service under emergency conditions.
- Reclaimed waste can often be developed into a valuable by-product.
- Maintenance of water cooled heat exchangers sharply reduced.

Filters are becoming more and more important as components of a modern plant's water system. If you feel you would like to discuss or study your own plant's water problem with a member of the R. P. Adams Company, Inc., organization, write us today, at 507 E. Park Drive, Buffalo 17, N. Y.

CONSERVE WATER, OUR MOST VALUABLE NATURAL RESOURCE

## R. P. ADAMS COMPANY, INC.

207 E. PARK DRIVE  
BUFFALO 17, NEW YORK

N-59

We have a problem involving liquid filtration. Ask your local representative to call on us.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

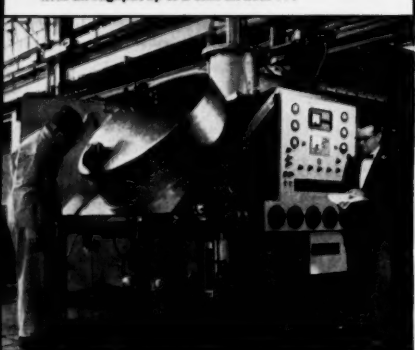
Street \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

One operator with very little training  
can run a whole bank of CEC stills . . .



with throughput up to 2 tons an hour . . .



for only .06 to .1 cent a pound.

## 16 tons for \$32

*CEC high vacuum stills cut process cost*

Now, for less than 1/10 cent a pound, you can separate tall oil, vitamin concentrations, plasticizers, waxes . . . hundreds of other organic and silicone compounds in the 250 to 4000 molecular weight range.

CEC continuous production stills run virtually unattended; fully automated, if you prefer. Economical low heat reduces product waste, gives you higher yield. 4 sizes: from 2 pounds to 2 tons an hour . . . 16 tons each 8-hour shift.

**Write** for High Vacuum Still Bulletin 3-1 . . .  
and for details on test runs of your samples.

*Consolidated Vacuum Corporation*

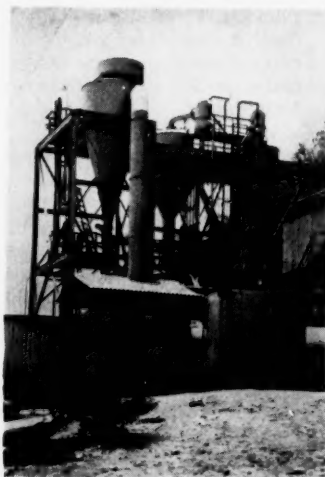
ROCHESTER 3, NEW YORK

A SUBSIDIARY OF CONSOLIDATED ELECTRODYNAMICS CORPORATION  
(FORMERLY ROCHESTER DIVISION)



### FIRMS . . .

in Resi-Chem Corp. of Swanton, Ohio. Brown, a pulp and paper producer, will make use of Resi-Chem's paper-making resins and plywood adhesives.



W. R. Grace & Co. will now operate the ammonia and ammonium sulfate plant of Gonzalez Chemical Industries, Inc., in Guanica, Puerto Rico. Ammonium sulfate unit with 400-ton/day capacity is shown above. With issuance of the Gonzalez contract, Grace extends its reach into rapidly developing Puerto Rico.

Calaveras Cement Co. announces plans for merger with the Flintkote Co. By joining their efforts, both companies hope to strengthen their position in the cement, asphalt and asbestos products industry.

Advanced Technology Associates has just been formed to offer chemical engineering services to the process industries. Headquarters for the new company are in San Antonio, Tex.

Vitro Corp. of America announces the formation of Vitro Chemical Co., a consolidation of Vitro Uranium, Heavy Minerals and Vitro Rare Metals companies. Consolidation will afford better service to Vitro customers.

Hagan Chemicals & Controls, Inc. has acquired the Bruner



Corp. of Milwaukee, Wis., manufacturer of water treating equipment. Bruner will now make use of Hagen's eight regional laboratories and central research center.

**Miles Laboratories, Inc.** has acquired Dome Chemicals, Inc., of New York, N. Y. Dome's pharmaceutical chemical business will complement Miles' well-established position in the pharmaceutical industry.

**National Starch & Chemical Corp.** has acquired the American Paperboard Corp. of Black Mountain, N. C. National Starch thus extends its versatility, may now produce flake board as well as splinter board.

**Norton Co.** announces change in name of Norton Behr-Manning Overseas, Inc. to Norton International, Inc. Norton will continue to operate its 16 plants for abrasive and refractory manufacture in ten countries.



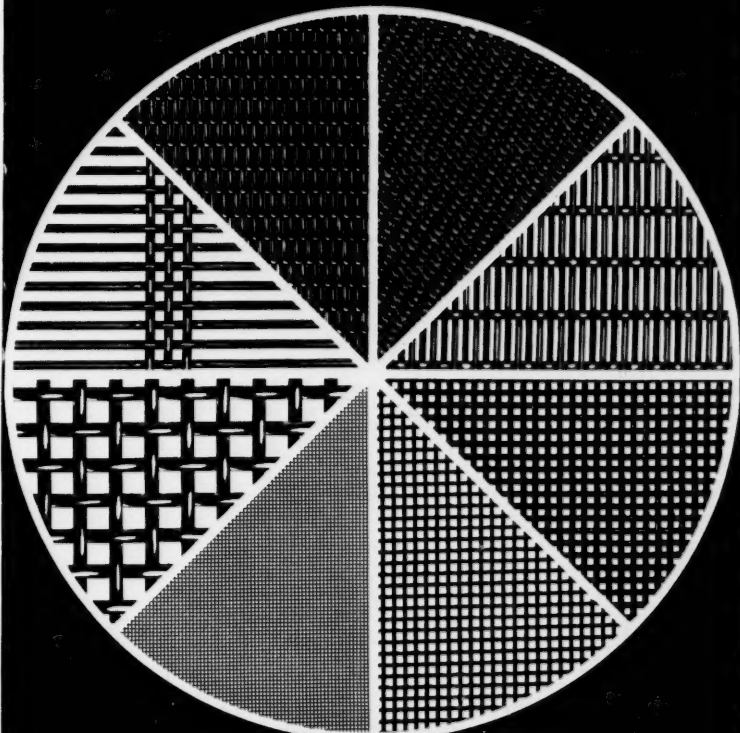
#### OVERSEAS BRIEFS

**Israel:** New facilities, to be constructed at Haifa, will produce 30,000 tons/yr. of copper from Cyprus copper pyrites. Joint Cyprus-Israel project will cost more than \$2-million.

**France:** Firestone Tire & Rubber Co. reveals plans for construction of a multimillion dollar production facility. The new plant, site undisclosed, will produce butadiene and styrene polymers as well as tires for the consumer.

**Libya:** Drastic reductions in the cost of water supply will result from the construction of an electrolysis water desalting plant at Tobruk, Libya; cost of drinking water will be cut from \$10 to \$1.60/1,000 gal. Ionics Inc., Cam-

Best industrial wire cloth and screen you can buy!



# Ludlow-Saylor

and **STAR**

**Filtering, straining, sizing . . .** whatever your operation, whatever problems it involves—corrosion, high pressure, vibration, heat, abrasion—there is a Ludlow-Saylor or Star wire cloth or screen to help produce a better, more uniform product with less trouble at lower cost.

Immediate shipment from stock on most weaves and sizes—or if your requirements are special, we can weave it promptly to specifications.



L-S and Star Cloth and Screens are woven from any steel including high-carbon, oil-tempered, stainless and other alloys; Monel, bronze, copper, brass or any metal that can be drawn into wire.

Write for Condensed Screen Reference Catalog

**LUDLOW-SAYLOR WIRE CLOTH CO.**  
613 S. Newstead Ave. • St. Louis 10, Mo.  
Birmingham 1727 Sixth Ave., No. Pittsburgh Union Trust Bldg.  
Chicago 6261 W. Grand Ave. Houston 5638 Harvey Wilson Dr.  
**STAR WIRE SCREEN & IRON WORKS**  
2515 San Fernando Road • Los Angeles 65, Calif.

## WHEN FURNACE ATMOSPHERES MUST BE DESERT-DRY...

Your gas generator manufacturer is quite likely to include a Lectrodryer when a dry controlled atmosphere is required. In this way he assures the constant dryness so necessary in many metallurgical furnace operations. Lectrodryers are long on engineering — have the built-in extra capacity that always seems to be needed. That's why they may cost somewhat more in the beginning, but cost considerably less in the long run. Ask your gas generator builder for advice on dry controlled atmospheres. For other drying help, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 303 32nd Street, Pittsburgh 30, Pennsylvania.



# Lectrodryer<sup>®</sup>

McGraw-Edison

### FIRMS

bridge, Mass., is supplying the electrolysis unit for the plant, being cosponsored by Libya and Tunisian governments.

**Brazil:** Alba, S. A., a subsidiary of Borden International, Ltd., has just placed on stream a 30-ton/day, high-purity methanol plant at Cubatao; plant output is used to produce formaldehyde. Vulcan-Cincinnati, Inc. engineered and managed construction of this plant, first to utilize the Inventa-Vulcan process in South America.

**Texaco Inc.** has just opened new technical service offices in Indianapolis, Ind. Texaco will thus afford improved service to its Ohio-Valley customers.

**Johnston & Funk Metallurgical Corp.** has moved its plant and office facilities from Wooster, Ohio, to Huntsville, Ala. New larger facilities will enable J & F to increase its output of titanium, zirconium and tantalum wire, strip and foil for space-age application.

**Parke, Davis & Co.** announces plans for construction of a Los Angeles, Calif., branch office and warehouse. Other plans for the future include construction of similar facilities in Chicago, Kansas City, San Francisco, Baltimore and Montreal.

**Italy:** Italian State Oil monopoly reveals plans for the construction of petroleum and chemical complex at Gela, Sicily. Project includes a petroleum coking facility, capable of handling 3-million metric tons/yr. of crude.

**Netherlands:** Koninklijke Swa-velzuurfabrieken v/h Ketjen N. V. announces plans for construction of a phenol plant at Amsterdam. Byproduct from the phenol process will be anhydrous sodium sulfite.

**Denmark:** Paint and Varnish Works, Copenhagen, Denmark, has formed the subsidiary, S. Dyrup & Co. in Casoria, Italy. New firm will manufacture

paints, enamels, varnish and other products for the construction industry.

**Egypt's** Ministry of Industry reveals plans for construction of an \$8-million pharmaceutical plant. New facility is expected to produce sulfa compounds, salicylic acid, streptomycin and penicillin.

**England:** Boots Pure Drug Co., Ltd., has just opened a new \$2.1-million research facility in Nottingham, England. Now the search will begin for cures to influenza, diabetes, tuberculosis, rheumatism and the common cold.

**Bolivia:** Compania Estanifere de Brasil reveals plans for construction of a 6,000-metric-ton/yr. tin refinery in Bolivia. Representatives from the Bolivian Government anticipate that the new plant will supply both Bolivian and Brazilian demands for tin.

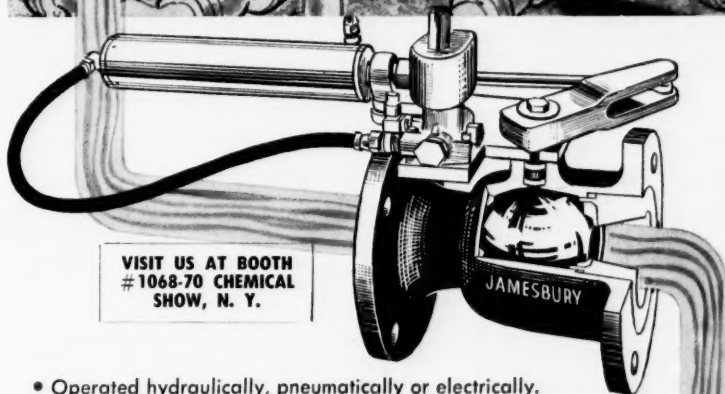
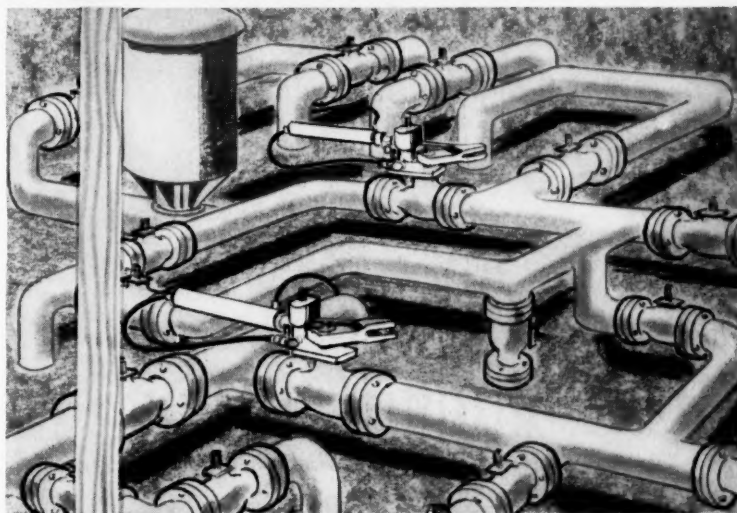
**France:** Dow Chemical International Limited, S. A., has joined with Pechiney, S. A., to form a new company, Plastichimie, S. A. New firm will operate a new Styron and Saran plant adjoining Pechiney's polystyrene plant at Ribecourt, France.

## NEW LOCATIONS

**Vulcan Manufacturing**, designers and builders of process equipment, have moved into a new plant and office in Woodlawn, Ohio. Vulcan has vacated facilities in Cincinnati.

**Intercontinental Chemical Corp.** announces relocation of Carbic-Hoechst Corp., Hostachem Corp. and Hostawax Co. to new office facilities in Mountainside, N. J. The three companies are U. S. technical representatives for Farbwerke Hoechst A. G. of West Germany.

# Double-Duty with Jamesbury REMOTE OPERATORS\* for "Double-Seal" Ball Valves



VISIT US AT BOOTH  
#1068-70 CHEMICAL  
SHOW, N. Y.

- Operated hydraulically, pneumatically or electrically.
- "Fail-Safe" constructions available.
- Available as a factory pre-tested unit for all Jamesbury "Double-Seal" Ball Valves: from high vacuum to 3000 p.s.i.

\* Standard speed for closure: less than  $\frac{3}{4}$  of a second.

Faster speeds available on request.

Distributors In Principal Cities.

Get The Complete Facts On All Jamesbury Products.

Name \_\_\_\_\_ Title \_\_\_\_\_

Company \_\_\_\_\_

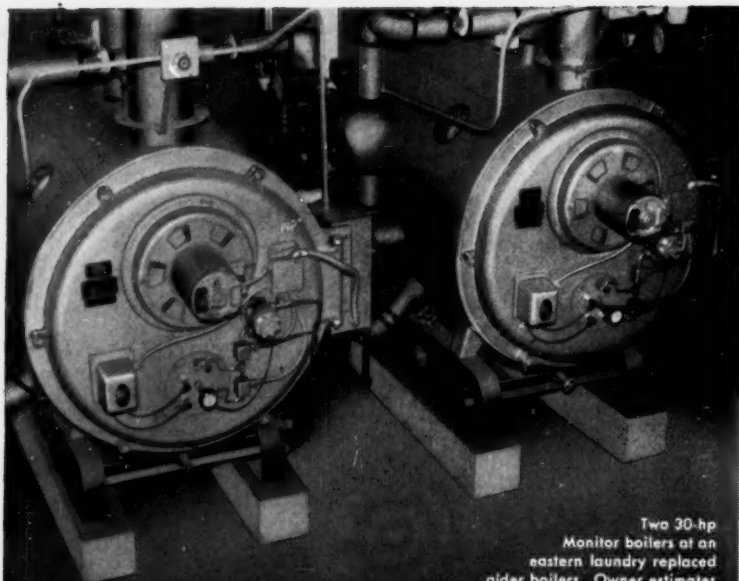
Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

- ☐ Jamesbury Literature  
☐ Distributor Service

JAMESBURY CORP., 75 NEW STREET, WORCESTER, MASS.



Two 30-hp Monitor boilers of an eastern laundry replaced older boilers. Owner estimates Monitor boiler efficiency will pay for cost in three years.

## Here's big performance from a small package

Cleaver-Brooks Monitor boilers are compact sources for dry steam—more of it at less cost means more profitable plant operation

Whatever your need for dry steam, Monitor packaged boiler will slash your costs, speed your operations. By any test, Monitor boiler is a practical investment in working steam.

Take fuel economy, for example. High fuel-to-steam efficiency—guaranteed at 80% minimum—can save your plant hundreds of dollars over boilers just 10% lower in efficiency. Monitor boiler is designed to the standards of larger industrial boilers to provide excellent heat transfer, high combustion effi-

ciency, proper air-fuel ratios.

You'll find 99% dry, working steam, ready response, and ample steam reserve make Monitor boiler a real workhorse for any job.

Factory tested, delivered as a complete package, ready to operate.

Available in sizes 15-60 hp, 150 psi, oil, gas and combination oil/gas fired. For the complete Monitor story, contact your representative or write Cleaver-Brooks Company, Box M, 345 E. Keefe Ave., Milwaukee 12, Wis. 53204.

**WE CAN  
DELIVER NOW!**

**Cleaver  Brooks®**

ORIGINATORS AND LARGEST PRODUCER  
OF PACKAGED BOILERS

## CALENDAR

**National Academy of Sciences-National Research Council**, construction conference, Shoreham Hotel. Nov. 16-20 Washington, D. C.

**Packaging Institute**, annual national Packaging Forum, Hotel Statler. Nov. 16-18 New York, N. Y.

**National Assn. of Corrosion Engineers**, annual general Florida conference, corrosion short course. Nov. 16-20 Miami, Fla.

**American Standards Assn.**, national conference on standards, Sheraton-Cadillac Hotel. Nov. 18-20 Detroit, Mich.

**Society of Plastics Engineers**, Technical Conference on plastics in packaging, Claremont Hotel. Nov. 19 Berkeley, Calif.

**American Rocket Society**, annual meeting, Sheraton-Park Hotel. Nov. 16-20 Washington, D. C.

**Instrument Society of America-American Institute of Electrical Engineers**, symposium on solid-state devices, Benjamin Franklin Hotel, Philadelphia. Nov. 23-24 Philadelphia, Pa.

**American Society of Mechanical Engineers**, annual meeting, Chalfonte-Haddon Hall. Nov. 29-Dec. 4 Atlantic City, N. J.

**Exposition of Chemical Industries**, New York Coliseum. Nov. 30-Dec. 4 New York, N. Y.

**National Council for Stream Improvement**, North America Pulp, Paper and Paperboard, Industrial Waste Conference, Edgewater Beach Hotel. Dec. 1-2 Chicago, Ill.

**Eastern Joint Computer Conference**, Statler-Hilton Hotel. Dec. 1-3 Boston, Mass.

**American Institute of Mining, Metallurgical and Petroleum Engineers**, Metallurgical Society, annual conference of Iron and Steel Div., Cleveland Hotel. Dec. 2-4 Cleveland, Ohio.

**American Institute of Chemical Engineers**, annual meeting, Sheraton Palace. Dec. 6-9 San Francisco, Calif.

**Chemical Specialties Manufacturers Assn.**, annual meeting, Mayflower Hotel. Dec. 7-9 Washington, D. C.

**American Medical Assn.**, clinical meeting, Dallas Auditorium. Dec. 7-10 Dallas, Tex.

**The Material Handling Institute**, annual meeting, Savoy-Hilton Hotel. Dec. 13-16 New York, N. Y.

**American Statistical Assn.**, annual meeting, Shoreham Hotel. Dec. 27-30 Washington, D. C.

**American Chemical Society**, Div. of Industrial and Engineering Chemistry, Christmas Symposium. Dec. 28-29 Baltimore, Md.



**Society of Plastics Engineers**, annual technical conference, Conrad Hilton Hotel.  
Jan. 12-15 Chicago, Ill.

**Engineers Joint Council**, annual meeting, Engineering Building.  
Jan. 22 New York, N. Y.

**Plant Maintenance and Engineering Show**, Convention Hall.  
Jan. 25-28 Philadelphia, Pa.

**American Society for Engineering Education**, college-industry conference, Washington University.  
Jan. 27-28 St. Louis, Mo.

**American Physical Society**, annual meeting, Hotel New Yorker.  
Jan. 27-30 New York, N. Y.

**American Rocket Society**, Solids propellants Conference, Princeton University.  
Jan. 28-29 Princeton, N. J.

**American Institute of Electrical Engineers**, national meeting.  
Jan. 31-Feb. 5 New York, N. Y.

**Instrument Society of America**, Instrument Conference and Exhibit, Sam Houston Coliseum.  
Feb. 1-5 Houston, Tex.

**American Society for Testing Materials**, committee week, Sherman Hotel.  
Feb. 1-5 Chicago, Ill.

**Society of the Plastics Industry**, Reinforced Plastics Div. meeting, Edgewater Beach Hotel.  
Feb. 2-4 Chicago, Ill.

**American Society for Metals**, metals conference, Fairmont Hotel.  
Feb. 4-6 San Francisco, Calif.

**American Institute of Mining, Metallurgical and Petroleum Engineers**, annual meeting, Sattler-McAlpin Hotel.  
Feb. 14-18 New York, N. Y.

**National Society of Professional Engineers**, winter meeting, Broadview Hotel.  
Feb. 18-20 Wichita, Kan.

**American Institute of Chemical Engineers**, national meeting, Biltmore Hotel.  
Feb. 21-24 Atlanta, Ga.

**Technical Assn. of the Pulp and Paper Industry**, annual meeting, Commodore Hotel.  
Feb. 22-25 New York, N. Y.

**Natural Gas Engineering Conference**, Oklahoma State University.  
Feb. 23-25 Stillwater, Okla.

**Pittsburgh Conference on Analytical Chemistry and Spectroscopy**, Penn-Sheraton Hotel.  
Feb. 29-Mar. 4 Pittsburgh, Pa.

**American Society of Mechanical Engineers**, Gas Turbine Power conference and exhibit, Rice Hotel.  
Mar. 6-9 Houston, Tex.

**American Society of Mechanical Engineers**, Hydraulic Conference, Rice Hotel.  
Mar. 6-9 Houston, Tex.

**Instrument Society of America**, Temperature Symposium, Deshler-Hilton Hotel.  
Mar. 9-11 Columbus, Ohio

**American Concrete Institute**, annual convention, Commodore Hotel.  
Mar. 14-17 New York, N. Y.

don't  
guess  
.....  
Liquid  
Levels...



## Specify a Liquidometer Gauge

Easy to read as a clock. A Liquidometer Gauge indicates the exact level at all times ... shows it at a glance. And gauge operation is completely automatic—as far as 250 feet from the tank—without need for auxiliary power of any kind.

A Liquidometer Tank Gauge measures virtually any liquid. It's simple to install—requires no maintenance. Many have provided over 30 years of efficient, dependable service. All are approved by Underwriters' Laboratories and Factory Mutual.

Whether your gauging needs require an automatic Liquidometer Gauge, a hydrostatic Levelometer or a tank-site-indicating Direct Reader, you'll get the best by specifying Liquidometer. For complete details write Dept. Q



**THE LIQUIDOMETER CORP.**  
LONG ISLAND CITY 1, NEW YORK

# Indicating Pneumatic Controller with Greatest Field Serviceability!



Designed by Robertshaw Engineers as a controller, transmitter, or receiver-controller for process applications demanding precision, economy and serviceability combined, this new unit is packed with obvious advantages:

- Proportional Action — 0.5% to 200%
- Automatic Reset Optional
- Fully Compensated Thermal System

Easily installed without special tools, this new Robertshaw controller offers maximum convenience. Open construction permits components to be removed, replaced, recalibrated on the spot without disturbance to the rest of the unit. Minimum number of pivots for low hysteresis, added sturdiness. All adjustments quickly made by hand; no tools needed. Temperature ranges (in 200° bands) from -30 to +450° F. Pressure ranges 0-20 psi., 3-15 psi. (as receiver-controller), 0-150 psi.

For complete specifications, ask for WC-757

**Robertshaw**  
ROBERTSHAW-FULTON CONTROLS COMPANY  
FULTON SYLPHON DIVISION • KNOXVILLE 1, TENNESSEE

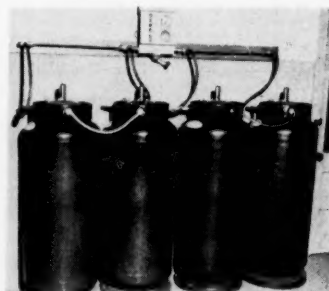


## NEW EQUIPMENT . . .

(Continued from p. 126)

the filling tube. The entire system is dust-tight.

Stainless steel is the material of construction for all parts coming into direct contact with the product.—Richardson Scale Co., Clifton, N. J. 126D



## Oxygen Manifold

Gives continuous gas supply from liquid cylinders.

Used with four LC-3 liquid-oxygen cylinders, the new M-40 manifold provides an uninterrupted source of 12,000 cu. ft. of oxygen. More than 48 conventional high-pressure cylinders would be needed to supply this quantity; these would occupy a far larger space.

As the supply in one cylinder bank depletes, the manifold automatically changes over to the other bank. Standard models come with two or four cylinders arranged in two banks.—Linde Co., New York, N. Y. 232A



## Plastic Tank Covers

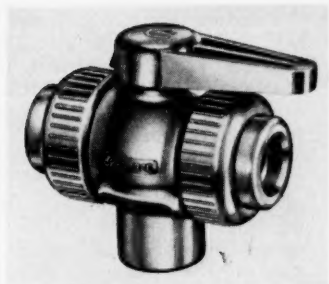
For high-temperature corrosion service.

Ceilecote Co. has introduced high-strength, self-supporting Duracore covers for tanks handling strong acid solutions at elevated temperatures. Expectations are that these new products will be capable of replacing

metal, brick and lead fabrications at comparatively low cost.

Shown above is one cover measuring 25 ft. in dia. and  $\frac{1}{2}$  in. thick. It can support the weight of two, 200-lb. men at any one point. A reinforced outer perimeter and I-beam construction make the assembly completely self-supporting.

Duracore is a reinforced plastic that can be drilled, sawed or molded to any configuration. Operating temperature range is about 280 to 300 F.—The Ceilcote Co., Cleveland, Ohio. 232B



#### Three-Way Ball Valve

Made of plastic for service with corrosives.

Fabricated from either Type I or Type II polyvinyl chloride, new three-way ball valves are especially designed for systems handling corrosive liquids. Either complete shutoff or flow diversion to each of two directions is possible. The valves are presently available in various combinations of  $\frac{1}{2}$ -,  $\frac{3}{4}$ -, and 1-in. port sizes.

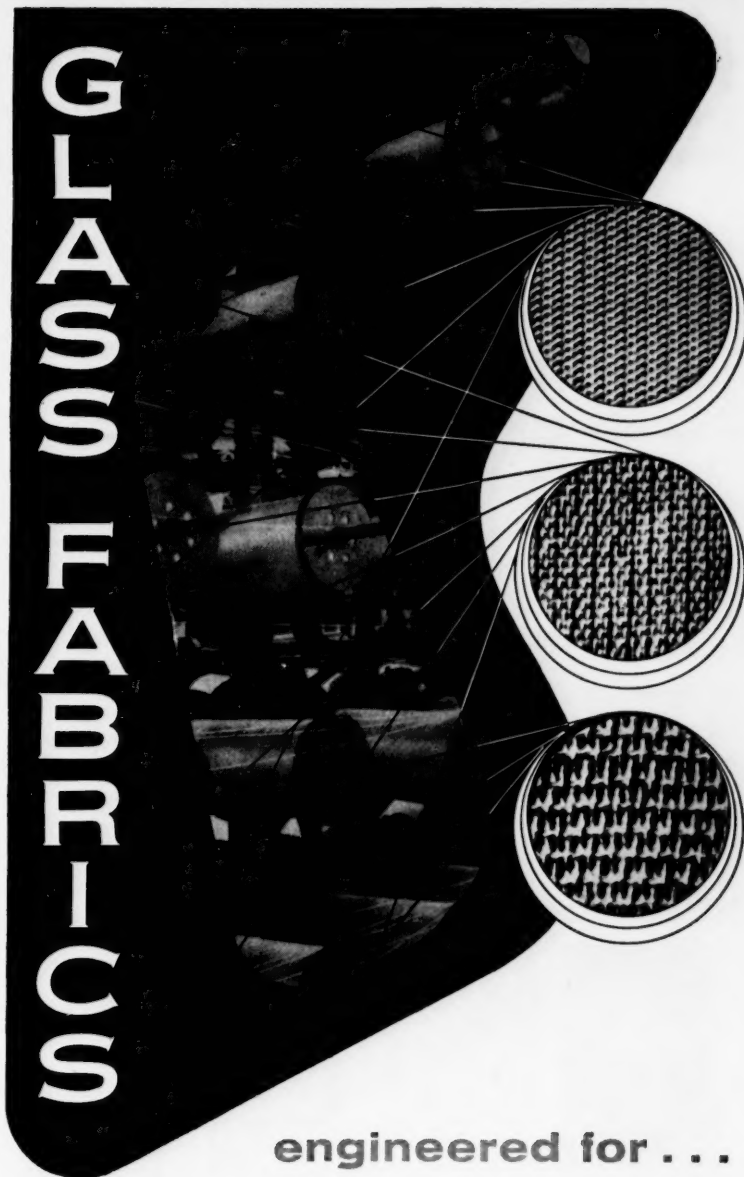
All parts are replaceable for easy maintenance; union-type connectors permit rapid disassembly after installation. The valves are compatible with all kinds of piping.—Chemtrol, Lynwood, Calif. 233A

#### From the East

Red bloc claims new gage, electron microscope.

From behind the Iron Curtain comes news of two recent equipment developments. The Czechoslovakian firm, Tesla, has developed a new table-size elec-

# GLASS FABRICS



engineered for . . .

- LIQUID FILTRATION
- PLASTICS LAMINATION
- HIGH TEMPERATURE DUST COLLECTION
- INSULATION

*Tell us your application, we will send you samples*



*Weavers of Industrial Filter Media for over Fifty Years*

**NATIONAL FILTER MEDIA Corporation**

General Offices and Mills: New Haven 14, Conn.

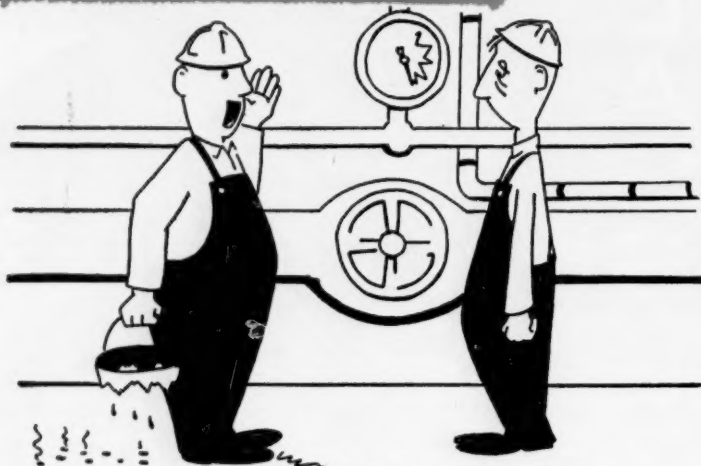
Western Office and Factory: Salt Lake City 10, Utah

#### Sales Offices—Representatives

Hudson, Ohio: 227 Hartford Drive  
Alhambra, Calif.: 20 South First Street  
Chicago, Ill.: 5034 N. Cicero Ave.  
Elizabeth, Tenn.: Paul Chapman Assoc., Box 787  
Toronto: Lee Banner Chem., C. P. R. Roadway,  
1119 Yonge Street

Mexico City: Maquinaria Minera, Apartado Postal #215  
Cincinnati, Ohio: Roselawn Center Bldg.  
Houston, Texas: 1807 Jefferson Ave.  
Pensacola, Fla.: Chem-Quip Co., 1102 Texas Drive  
Montreal: Lee Banner Chem., 4700 Prince of Wales

## Life in these excited states ...



"I said, I borrowed a pail of acid... O. K.?"



**ACE-ITE**  
all-purpose toughness  
High-impact, rubber-plastic, most economical for average chemicals.  $\frac{1}{2}$  to 6". Screw or solvent welded fittings. Valves  $\frac{1}{2}$  to 2". NSF-approved. Bul. 80A.

## Time Can't Be Borrowed Either

Equipment running on borrowed time due to corrosion has a knack of dropping the bottom out of production when you can least afford it. No need to risk it... just specify Ace chemical resistant equipment. Best for the money anywhere... backed by 108 years' experience.



**ODD SHAPES?**  
you make...we line  
Rubber or plastic lining is economical life insurance for costly "special" equipment. It's a specialty with ACE. Write for Bul. CE-53.



**PLASTIC VALVES**  
for matched systems  
Choice of Rivclor PVC, Ace-ite rubber-plastic, Ace polyethylene or Ace Saran to match any plastic pipe. Sizes  $\frac{1}{2}$  to 2". Also larger plastic-lined valves.



**PACHYDERMOUS PAUL**  
Ace-Hide, tough as a rhinoceros, insensitive to corrosives, makes this finest of acid pails. Also dippers, bottles, funnels, etc.



**ACE** processing equipment of rubber and plastics

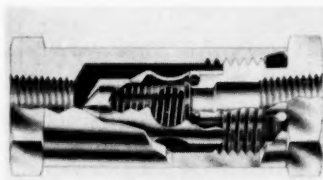
**AMERICAN HARD RUBBER COMPANY**  
DIVISION OF AMERACE CORPORATION  
Ace Road • Butler, New Jersey

## NEW EQUIPMENT . . .

tron microscope. And, Estonian and Latvian scientists have designed a new radiation thickness gage.

Tesla's electron microscope operates on an accelerating voltage of 60 kv. to reach a resolving power of more than 50 angstroms. The firm claims that direct electron optical magnification can be controlled in ten stages from 1,000 to 30,000 power. A special feature is the specimen chamber, which can be loaded or emptied without influencing vacuum built up inside the column.

Tass reports that the automatic thickness gage will save the Soviet economy billions of rubles. Variations in the thickness of tested materials are compared with a standard thickness scale via differing intensities of isotope radiation received at the ionization chamber. Details on the gage will be given to Western experts during the forthcoming Conference on the Industrial Utilization of Radioactive Isotopes in the United States.



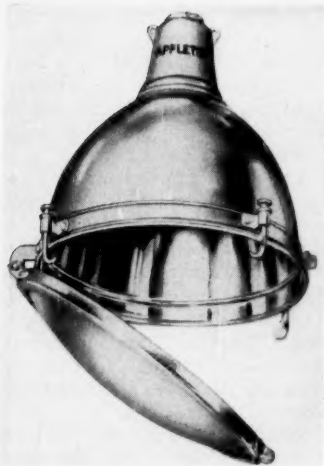
## Check Valves

**Disk-type units claim fast action. Leakproof.**

Extremely low back pressure, fast action and high versatility are features claimed for the new 750 Series of check valves. Units have a standard cracking pressure of 0.5 psi. The manufacturer guarantees all valves to be absolutely leakproof at all pressures.

Because design is of the disk variety, the valves are very sensitive to flow reversal, and act rapidly. Presently available in brass, in  $\frac{1}{2}$ -in. pipe size, they will be ready soon in other sizes and materials. Prices start at \$3.75.—Bodnar & McDermott Mfg. Co., Mt. Vernon, N. Y. 234A



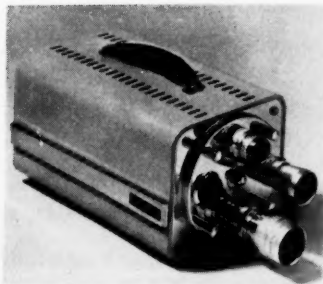


### Floodlights

For severe-condition industrial locations.

Floodlighting in locations where smoke, fog, dirt, moisture and grime affect lighting performance may be improved with introduction of the new line of vaporproof "Industrialites." A cast-aluminum socket hood that fits under the reflector neck eliminates loosening of the reflector.

Industrialites are now available with etched or specular reflectors, stippled or plain heat- and impact-resisting covers, and incandescent or mercury vapor lamps.—Appleton Electric Co., Chicago, Ill. 235A



### Direct-Wire TV System

Low-cost camera may broaden industrial TV.

Argus Cameras has entered the audio-visual field with introduction of a new direct-wire television system aimed at

Life in these excited states...

"Have you seen the pipe inspector?"



## How Ace keeps you out of the tight spots

We admire men who jump right into the tough problems, but our business is eliminating problems completely. That is, problems of corrosion and contamination in piping, valves, pumps, tanks, and the like. Good equipment keeps you always in the clear. Our 108 years of experience is at your service.

Ace chemical-resistant rubber-lined steel pipe best for high-pressure, big sizes, or abrasives. Pipe, fittings and valves 1½ to 24".

STRENGTH OF STEEL



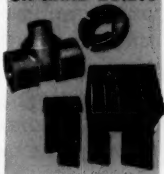
Highly efficient WE pump. Capacity to 360 gpm. Cast iron, fully protected by top quality, chemical resistant hard rubber lining.

BIG GIANT OF ACID PUMPS



Design assistance and facilities for molding special fittings, pump parts, etc., of plastics or hard rubber. Also large hand-fabricating facilities.

CUSTOM MOLDED OR HAND BUILT?



Variety and quality to match any plastic piping. Riviclor PVC, Ace-It rubber-plastic, Parian poly, Ace Saran, Tempron high temperature nitrile, hard rubber-lined steel.

Supermarket for PLASTIC FITTINGS



# ACE

processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY  
DIVISION OF AMERACE CORPORATION  
Ace Road • Butler, New Jersey



# NEW



## ULTRASONIC THICKNESS GAGE

Now you can measure wall thickness accurately with Sperry's new direct reading ultrasonic thickness gage. Battery-operated, it is small and light enough (10 lbs.) to be carried anywhere — to inspect ship hull plates, bulkheads, storage vessels, high pressure pipe.



Using the pulse echo method, this new Sperry thickness gage works even where surfaces are not parallel or where they are corroded and rough. Easy-to-read meter is directly calibrated in inches, and alarm lamps are provided for go-no-go operation or when testing in dark areas.

There is a full line of ultrasonic inspection instruments available from Sperry, for fourteen years leading designers and engineers of ultrasonic testing equipment and SIMAC automated inspection systems.

*Write for descriptive literature.*

## Sperry Products, Inc.

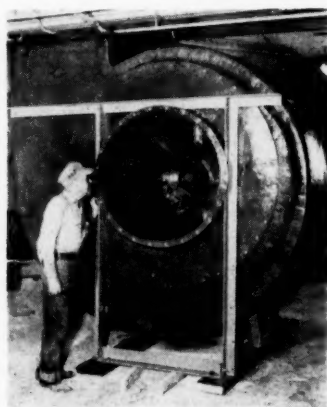
D a n b u r y ,   C o n n e c t i c u t

### NEW EQUIPMENT . . .

breaking the "present price barrier." Heart of the system is a lightweight vidicon camera that will have a manufacturer's suggested list price of \$595.

Through application of a junction box, multiple receivers may be used simultaneously. A simple coaxial-cable connection links the camera and receivers. Special lighting is not required. The mount accommodates wide-angle, standard and telephoto lenses simultaneously. A fourth lens position is available for special applications.

Each camera houses its own controls, eliminating the need for a second console. — Argus Cameras, Div. Sylvania Electric Products, Inc., N. Y. 235B



### Centrifugal Fans

**High-capacity units resist attack by corrosives.**

Shown in the photograph above is one model of a new line of large-size, resin-reinforced, glass-fiber centrifugal fans. The unit illustrated is capable of delivering 32,000 cfm. at 2 in. static pressure. The wheel requires 25 hp., and rotates at 786 rpm.

Fan wheels are dynamically balanced to assure completely vibrationless operation. Construction is lightweight, strong and smooth. Material does not collect on internal surfaces to cause unbalance. The manufacturer offers a complete line of resin formulations to suit most corrosive conditions. — du Verre, Inc., Arcade, N. Y. 236A

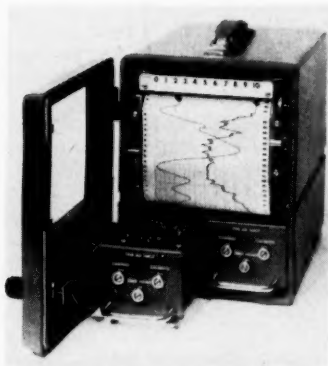


### Control Valve

Single actuator for air-to-open or air-to-close.

Newest addition to the Bantam line of control valves, is the versatile 540 Series. Air will either open or close each valve, depending on whether the actuator is inverted.

Standard body pressure rating is 300 psi. Temperature rating is 450 F. with standard bonnet, while operator temperature rating is 180 F. maximum. Flow coefficient ranges from 0.002 to 13.2. Material of construction for the operator is aluminum.—George W. Dahl Co., Inc., Bristol, R. I. 237A



### Two-channel Recorder

Both pens utilize full width of the chart.

Varian G-22 is a new, dual-channel, strip-chart recorder that comes in both portable and panel versions. Both pens traverse the full width of a 5-in. chart.

G-22's range adjusts from 0-9 mv. to 0-100 mv. Accuracy

The most efficient "TRAP"

made for filtration and processing

**SOLKA-FLOC®**

FOR FASTER, more productive filtration of fruit juices, foods, water . . .

This virtually 100% pure cellulose offers more advantages as a filter medium in many food processing applications.

SOLKA-FLOC is easy and economical to use. Its fibrous structure effectively retains pulp particles and at the same time greatly increases the flow of juice through the press cloths. Only small quantities of SOLKA-FLOC are required to "trap" the most minute suspended solids and produce maximum yields.

If you have an extraction problem, get the facts about SOLKA-FLOC, write Dept. FD-11 at our Boston office.

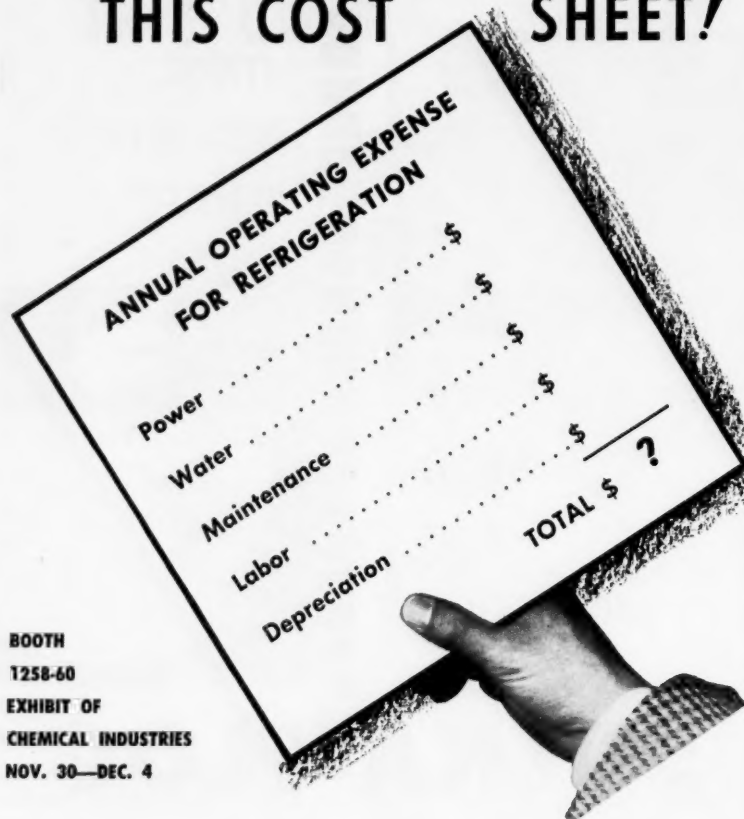
**BROWN COMPANY**

Berlin, New Hampshire

General Sales Offices: 150 Causeway Street, Boston 14, Mass.

Sold in Canada by Brown Forest Products, Ltd., Montreal, Que. (Alpha-Floc)

# DON'T OVERLOOK THIS COST SHEET!



BOOTH  
T258-60  
EXHIBIT OF  
CHEMICAL INDUSTRIES  
NOV. 30—DEC. 4

## YOU CAN REDUCE MANY OF THESE COSTS!

By having the refrigeration system designed to meet your specific requirements and by buying the entire system of equipment from a manufacturer with a background of experience and reputation in this highly specialized field.

Frick Company has been designing, manufacturing, and installing commercial and industrial refrigeration systems since 1882.

Whatever type you need—cold storage, ice making, air conditioning, quick freezing, very low temperature, or process cooling—Frick engineers will design a system to serve you with dependability and economy.

*Let FRICK ENGINEERS Provide a Frick System for You Today.....*

OFFICES AND DISTRIBUTORS WORLD-WIDE

DEPENDABLE REFRIGERATION SINCE 1882  
**FRICK CO.**  
WAYNESBORO, PENNA., U. S. A.

## NEW EQUIPMENT . . .

is 1% of full scale. Chart-speed options range from  $\frac{1}{4}$  in./hr. to 8 in./min. Available accessories include alarm contacts, retransmitting potentiometers and event markers for either or both margins of the chart.—**Varian Associates, Instrument Div.**, Palo Alto, Calif. 237B

## BRIEFS

**Indicating controller** for temperature has an operating range of -50 to 1,200 F. Both case and tubing are compensated for ambient temperature variations. A liquid-filled thermal system assures high sensitivity.—**Minneapolis-Honeywell Regulator Co.**, Philadelphia, Pa. 238A

**Globe valves** for high-temperature and high-pressure service are available in sizes  $\frac{1}{4}$  through 1 $\frac{1}{2}$  in. Maximum pressure is 6,000 psi. at 100 F. Maximum temperature is 900 or 1,100 F., depending on model. Materials of construction include Monel, Inconel, Hastelloy and Duramet.—**Associated Valve Co.**, North Wales, Pa. 238B

**Small tubing** made from columbium, tantalum or vanadium is now available in commercial quantities. Sizes vary from 0.012 to 1.125 in. outer diameter.—**Superior Tube Co.**, Norristown, Pa. 238C

**Copying machine** for the office does not require sensitized or treated papers. Exposure or developing adjustments are unnecessary. A dial regulates the number of automatically produced copies. Operation is based on the xerographic principle (*Chem. Eng.*, Dec. 29, 1958, p. 100).—**Haloid Xerox**, Rochester, N. Y. 238D

**Portable air/foam system** for firefighting consists of an aluminum playpipe, a pick-up tube, and a supply of 3% high-expansion foam compound. Water pressure through the playpipe creates a jet action that draws foam



compound into the pickup tube. — **The Fyr-Fyter Co., Dayton, Ohio.** 238E

**Planetary stirrer** homogenizes, kneads, mixes or beats. Speed is continuously adjustable. The unit comes in eight different sizes with bowl capacities ranging to 30 gal. Bowl jacketing is optional. — **Epic, Inc., New York, N. Y.** 239A

**Filter bags** made of a new glass fabric show a permeability rating of 81 cfm./sq. ft. as compared to the manufacturer's previous line rating of 17 cfm./sq. ft., with no loss in efficiency. Maximum operating temperature is about 500 F. — **Menardy & Co., El Segundo, Calif.** 239B

**Fire extinguishers** that dispense dry chemicals under pressure are available in 10-, 20- and 30-lb. capacities. These hand-units use a propellant gas to expel the extinguishing agent. Improved recharging procedure and simplified maintenance are cited as advantages. — **Ansul Chemical, Marinette, Wis.** 239C

## Equipment Cost Indexes . . .

	March 1959	June 1959
<b>Industry</b>		
Avg. of all.....	232.6	234.3
<b>Process Industries</b>		
Cement mfg. ....	225.8	227.9
Chemical .....	233.7	235.7
Clay products .....	219.4	221.5
Glass mfg. ....	220.7	222.5
Paint mfg. ....	224.4	226.6
Paper mfg. ....	225.2	227.1
Petroleum ind. ....	229.2	231.4
Rubber ind. ....	232.0	234.0
Process ind. avg....	230.1	232.8
<b>Related Industries</b>		
Elec. power equip....	236.5	246.7
Mining, milling .....	235.2	237.1
Refrigerating .....	262.2	264.7
Steam power .....	219.7	221.8

Compiled quarterly by Marshall and Stevens, Inc., of Chicago, Ill., for 47 different industries. See Chem. Eng., Nov. 1947, pp. 124-6 for method of obtaining index numbers; Feb. 23, 1959, pp. 149-50 for annual averages since 1913.

## NEW FROM KAISER CHEMICALS

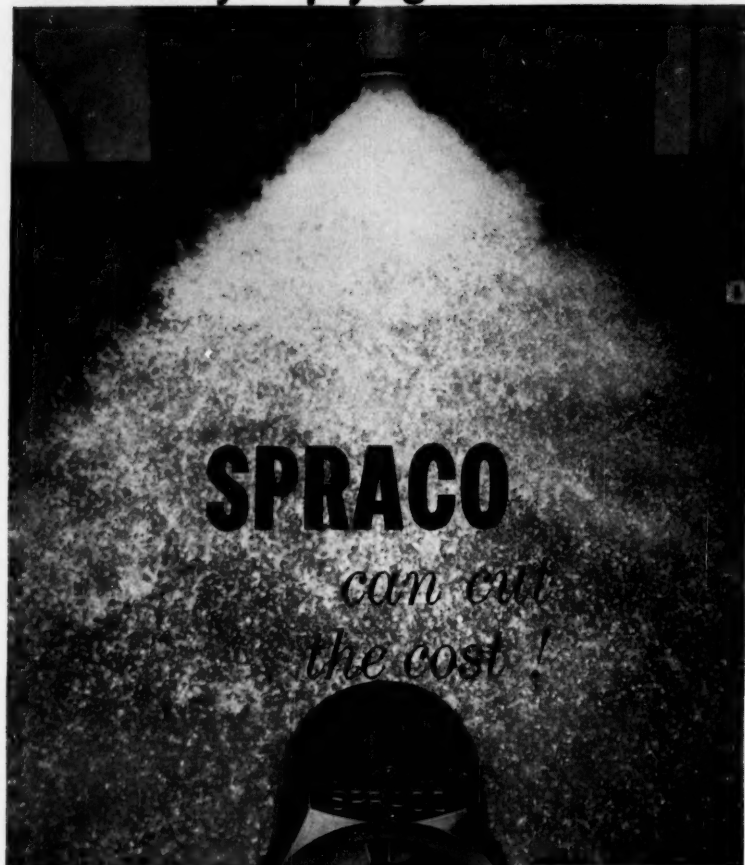
### ACTIVE ALUMINAS

**KAISER**  **CHEMICALS**

Send Coupon For New  
Technical Brochure,  
"Kaiser Aluminas"

Write for your free technical brochure with complete information on the new Kaiser Active Aluminas. Name \_\_\_\_\_ Title \_\_\_\_\_ Company \_\_\_\_\_ Street \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

# What are you paying for SPRAYING?



## EXAMPLE:

*Spraco Full-Cone Free-Flow Nozzles — for high capacity, low pressure installations*

*Spraco full-cone, free-flow nozzle discharging 860 gpm at 5 psi. At this shutter speed (1/5,000 sec.) pump pulsations are apparent in the spray pattern.*

To answer a long felt processing need, Spraco recently developed a totally new line of full-cone, free-flow nozzles for high capacity, low pressure installations where clogging is a problem and a full-cone spray a necessity. Featuring streamlined internal vane construction with maximum vane openings, they offer minimal flow resistance, virtually eliminate clogging.

Now widely used in cooling towers, coke quenching, aerating and purifying water supplies, and a host of chemical processing applications, Spraco Full-Cone Free-Flow nozzles are another excellent example of how Spraco cuts the cost of spraying by increasing the efficiency of the system.

**What's your spray nozzle problem?** Spraco offers the most complete range of nozzle sizes and capacities available anywhere, always in stock, and made from bronze, cast iron, stainless steel, or, to order, from any special machineable material.

Write today for the most comprehensive spray nozzle catalog ever published. Complete, accurate performance data for each of the hundreds of spray nozzles in the line.

**SPRACO ENGINEERING COMPANY,** 115 Cambridge Street,  
Burlington, Mass.

Visit Us at the Chem Show—Booth 1229

# SPRACO



## TECHNICAL



KORROZIYA is the topic.

## Iron-Curtain Corrosion

**CORROSION OF CHEMICAL APPARATUS.** By G. L. Shvartz and M. M. Kristal. Translated from the Russian. Consultants Bureau, Inc., New York. 250 pages. \$7.50.

Don't let the title of this book fool you. Either the original Russian publisher, or the translator is to blame, but the correct title should be, at the very least, "Corrosion Cracking of Chemical Apparatus." For this English translation of a Russian monograph is concerned only with stress-corrosion-cracking in chemical equipment—it's not a treatment covering all aspects of corrosion.

The authors, however, have packed a lot of useful information into this little book.

They go into the problems of stainless steels, aluminum, copper, lead, titanium, with valuable chapters on practical methods of protection against corrosion cracking and test methods.

Obviously well read in the field, Shvartz and Kristal list a grand total of 219 references. Many are to the Russian literature but there are quite a few U. S. books

## BOOKSHELF

J. B. BACON

and articles mentioned. In fact the authors reproduce a report by the National Association of Corrosion Engineers on cracking in alkali environments.

These references may be very beneficial in some ways, but they make reading of the book somewhat difficult. For studded throughout the text are statements such as "Scheil et al have studied . . ." "Ellis describes the case of cracking . . ." and "Lashko and Nesterova showed that . . ." The authors depend a great deal on published information, and in some ways have produced a glorified literature survey.

Also, some of their statements are a little puzzling. For instance under chromium steels, there's a paragraph which starts off, "The theory of impoverishment of the grain boundaries in chromium, which is extended by a number of authors not only to chromium-nickel but also to high-chromium steels, is contradicted by the findings of Houdremont and Tofaute, Levin and Gintsberg. These authors show that the cause of intergranular corrosion of high-chromium steels lies in the precipitation of nonequilibrium, easily decomposed carbides containing large amounts of iron."

This seems to be an attack on the theory, widely accepted in this country, that stress corrosion in stainless (particularly austenitic stainless) can be caused through precipitated chromium carbides at the grain boundaries, resulting in a chromium depleted zone anodic to the carbides and the grains. An attack then takes place along the grain boundaries.

But in their section on austenitic chromium-nickel steels, the authors do an about face, and quote U. S. experts in coming to the conclusion that intercrystalline corrosion of austenitic stainless steels is brought about by precipitation of carbides, rich in chromium, at the grain boundaries, producing a chromium-impoorished zone.

Besides these conflicting state-



**FOR CORROSIVE OR  
COSTLY FLUIDS OR GASES  
GET THE FACTS ON  
CHEMLON<sup>®</sup>  
PACKINGS**

...acids, alkalis,  
solvents, toxics,  
food products  
up to 600°F.

FABRICATED  
FROM DUPONT  
TEFLON

**JOHN CRANE'S** line of Chemlon Packing offers an unlimited selection of types, shapes and sizes for practically every service requirement:

- . . . . types best suited for valves and automatic regulators.
- . . . . for high or low-speed centrifugal, rotary or reciprocating pumps.
- . . . . for agitators and mixers.

Here in one bulletin is illustrated and described industry's most complete line of chemically inert packings. You'll save time, trouble and expense on fluid or gas handling problems by requesting Bulletin P-325.

Crane Packing Company, 6400 Oakton Street, Morton Grove, Illinois (Chicago Suburb). In Canada: Crane Packing Co., Ltd., Hamilton, Ont.



# Call on... BETHLEHEM'S EXPERIENCE

## FOR AGITATED, JACKETED DRYERS AND REACTORS

Our many activities in serving the chemical industry for over 50 years, have produced a wide range of techniques for manufacturing quality, heavy-duty process machinery. For example:

### DRYERS

#### Horizontal & Pan

Manufacturers are using Bethlehem Dryers for the following materials:

Starch	Fine Chemicals
Plastics	Pharmaceuticals
Lithium Chloride	Titanium Tetrachloride
Dyestuffs	Sludge
Intermediates	Sodium Fluosilicate

### REACTORS—Autoclaves

Used for the following processes:

Reclaiming Rubber	Production of Resins
Ammoniation	Intermediates
Sulfonation	

The following features of Bethlehem Dryers and Reactors make for lower first cost, lower maintenance, and longer life.

1. In the case of Dryers, heavy-duty agitation with positive scraping of the ribbon or plow types.
2. In the case of Reactors, anchor paddle or turbine type.
3. Heavy-duty bearings and stuffing boxes are standard in both types of equipment.
3. Design Simplicity.

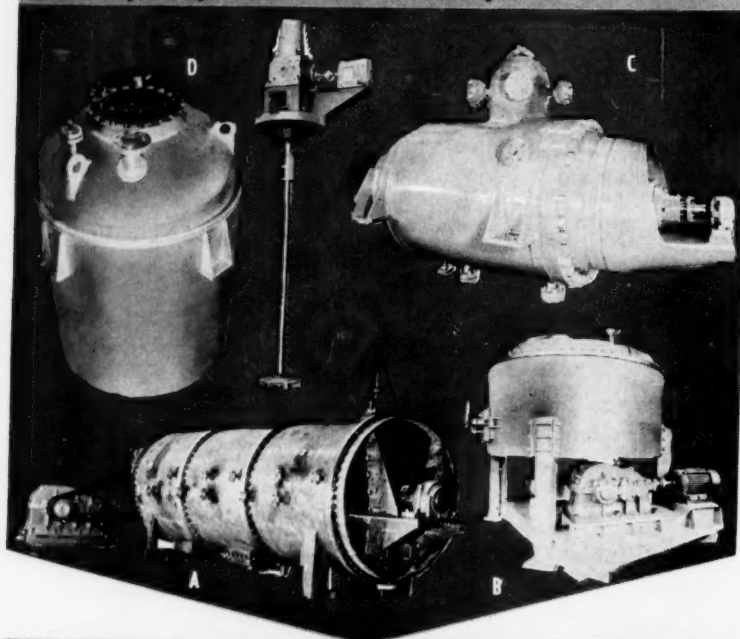
For full details of our horizontal and pan dryers and reactors, write for our illustrated technical bulletins.

A—3' diameter, 16' long, horizontal Thermocell® dryer with spring loaded scraper.

B—4' diameter stainless steel pan dryer designed for both heating and cooling.

C—200 gallon experimental autoclave for digesting reclaimed rubber.

D—1000 gallon ammoniation autoclave, complete with turbine agitator.



# BETHLEHEM foundry & machinery co.

4 Plaza Square

Bethlehem, Pennsylvania

## BOOKSHELF . . .

ments, the book bears evidence of sloppy editing or translating. Two classic examples are in the references: Ref. 176 reads "J. L. Everhart, Titanium and Titanium Alloys, N. J., 1954," Ref. 11 is listed as "Symposium on Stress-Corrosion Cracking of Metals, N. J., 1944."

Nevertheless, putting poor editing and some inconsistencies aside, this book is an invaluable guide to the latest Soviet thinking on stress corrosion.—RBN

## Personal, Interesting

ENGINEERING EDUCATION IN RUSSIA. By Stephen P. Timoshenko. McGraw-Hill Book Co., New York. 47 pages. \$2.75.

This is a rather personal, yet revealing, book about certain aspects of Russian engineering education. What it lacks in comprehensiveness, it tries to make up in its special focus. The author, well known in this country, taught in Russia 40 years ago and in 1958 visited that country again. He treats the subject in the light of his unique experience.

For example, writing of his early U. S. teaching experience with an industrial concern, he says:

"At this time I had a chance to learn first-hand what knowledge these young engineers bring from their school. . . I was teaching stress analysis but very soon found that my pupils had so little knowledge of strength of materials that I was finally forced to give an elementary course in strength of materials such as I was used to giving to sophomores in Russia. . . Admittedly the situation in America has improved . . . but with our poor secondary school preparation and our four-year engineering school curricula, we cannot possibly accomplish as much as the schools of Russia are doing today."

A brief history of Russian engineering development shows that emphasis on science and engineering was strong well before the Communist revolution. In 1807 at St. Petersburg, the Institute of Engineers of Ways of Communication was organized



after the pattern of the highly successful and now famed Ecole Polytechnique in Paris. Clapeyron and Lame taught there. As early as 1727, Bernoulli and Euler sat in the Russian Academy of Sciences. And, in a somewhat more topical note, Timoshenko reminds us that in 1912, Zhukowsky published the first systematic presentation of aerodynamics in the world's literature. He tells us also that Russia now leads in some fields of theory of elasticity, in stability of motion, nonlinear vibrations and dynamics of bodies of variable mass.

The book is not nearly as thorough as Alexander Korol's "Soviet Education for Science and Technology." (See *Chem. Eng.*, Feb. 24, 1958, p. 168.) Indeed—and this is the book's most serious defect—because the author's experience is in mechanical engineering, much of the book is concerned solely with this field.—JBB

#### BRIEFLY NOTED

**CONTROL OF VARIABLES IN HEAT-RESISTANT, GLASS-REINFORCED PLASTICS.** Vol. 1, SUMMARY REPORT, 62 pp., \$1.75; ENGINEERING REPORT, 580 pp., \$7. Order PB 151802 from Office of Technical Services, U.S. Department of Commerce, Washington 25, D. C. States conditions for making highest quality panels for specific properties evaluates test and quality-control methods.

**STATUS REPORT ON FUEL CELLS.** 119 pp. By B. R. Stein, Army Research Office. Order PB151804 from Office of Technical Services, U.S. Department of Commerce, Washington 25, D. C. \$1.25. Contains a general description of fuel-cell operation, descriptions of a variety of fuel-cell systems; reviews program supported by Department of Defense.

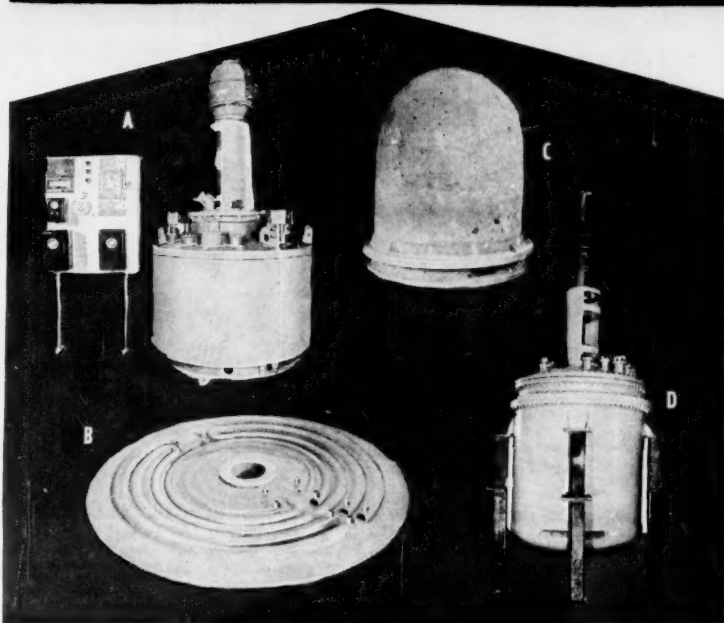
#### MORE NEW BOOKS

**PETROLEUM REFINERY MANUAL.** By Henry Martyn Noel. Reinhold. \$7.95.

**THE PHYSIO-CHEMICAL CONSTANTS OF BINARY SYSTEMS IN CONCENTRATED SOLUTIONS.** Vol. 2. By Jean Timmermans. Interscience. \$29.

## BETHLEHEM'S EXPERIENCE

SAVES YOU MONEY ON  
ENGINEERED PROCESS EQUIPMENT



#### Chemical Castings

A—Electrically heated Bath-tec Unit for laboratory testing.

B—Replacement of end-head with heating coils for dryer (for repair of "obsolete" equipment)

C—Cast iron sulfonator body for jacketed unit.

D—Fabricated stainless steel reactor complete with agitator and drive.

Our more than 50 years foundry experience saves you money on chemical process castings. For example: gray iron and ductile iron castings in a wide range of applications from caustic pots to cast iron reactors—for a multitude of processes for:

Sulfonated Products      Sodium Bisulfate  
Dyestuff Intermediates      Production of Caustic

These castings are engineered to your specific requirements.

**Bath-tec Molten-Salt Heat Transfer Systems** for supplying heat to systems for the production of:

Anhydrous Caustic      Maleic Anhydride  
Phthalic Anhydride      Methyl Amines

Also used for heating and forming metals and plastics.

#### VESSELS AND SPECIAL MACHINES

Bethlehem is equally experienced in the rehabilitation of process equipment and in converting drawings into new machines.

For better than half a century, we have worked with the cement industry in rehabilitating broken down, worn out machinery.

As compared with this, we have just recently manufactured an enamelled strip mill to our customer's own drawings.


Much of our fabricating work is done in stainless steel, monel, nickel, and in their clads.

For complete details, write for our illustrated brochure and facilities list.

**BETHLEHEM**  
FOUNDRY & MACHINERY CO.  
6 Plaza Square, Bethlehem, Pa.



**SLIMLINE**  
and Conventional Chemical  
**FUME HOODS**



**DURALAB**  
EQUIPMENT CORP.

**CATALOG DH3**

DURALAB EQUIPMENT CORP. 979-995 LINWOOD ST. BROOKLYN 8, N.Y.

After years of Study,  
Research and Development  
Duralab offers

**the ultimate in  
FUME HOOD  
Design and  
Engineering**

- A FREE COPY  
of this new and  
comprehensive  
Fume Hood  
Catalog DH3  
is yours on  
request.

See our catalog  
in Sweet's  
Architectural Catalog  
File #  
23L  
Du

**DURALAB  
EQUIPMENT CORP.**

984 Linwood Street, Brooklyn 8, N.Y.

Manufacturers and Designers of Laboratory Furniture and Equipment

Visit our booth #359  
at the 27th Exposition  
of Chemical Industries,  
Coliseum, New York  
City, Nov. 30-Dec. 4,  
1959

## LETTERS:

### Pro: Divisional Name

Sir:

In your Aug. 24 issue (p. 82) you published an extract of a news release on our new grain fumigant, Clorofume.

Your editor used his blue pencil rather effectively, because he eliminated the name of our company and also the name of the product. Inquiries have been going to Vulcan Materials Co., our parent organization in Birmingham, Ala. However, they have nothing to do with the marketing of our products and, therefore, this merely causes extra work for them and for us and causes a delay to your readers.

I hope that in future instances you will remember us as Frontier Chemical in Wichita.

MELVIN E. CLARK

Frontier Chemical Co.  
Wichita, Kans.

### Government Was First

Sir:

In your Sept. 21 *Chementator* (p. 67) you state that Uranium Reduction Co., Moab, Utah, is first to convert to alkaline leaching followed by resin-in-pulp ion exchange of uranium from the carbonate solutions.

Your article is in error, since this process was piloted at the Grand Junction, Colo., pilot plant, and the process has been on stream at the government-owned mill at Monticello, Utah, for the past 14 months. Both these facilities are contract operated by National Lead Co.

G. K. COATES

National Lead Co.  
Monticello, Utah

► We were aware of National Lead's contributions to this aspect of uranium processing technology and apologize for failing to include due credit in our brief news story. We described the Moab plant as the first "commercial" plant to use the new process; the term "privately owned" would have been more accurate.—Ed.

## for Top Performance... it's always Heyl & Patterson CYCLONES



The H & P 1½" Cyclone processes up to 2 GPM and is capable of unusually sharp separation in the -15 micron range. Recoveries approaching 100% have been recorded with fine crystals (1.35 Sp. Gr.), with less than 10% of feed fluid reporting to the thickened product.

Interesting applications include: Removal of abrasive material from slurries to protect expensive processing equipment—increase capacity of mechanical Centrifuge 25% by using H & P Cyclone as pre-thickener.

H & P Cyclones are built from 1½" to 36" diameter. Consult our listing in CEC or request bulletin 1157-CY1.



**HEYL & PATTERSON Inc.**

55 FORT PITT BLVD. PITTSBURGH 22, PA.

## PRO & CON

C. H. CHILTON

### Pro: Alaska's Future

Sir:

When you edited my article on "Alaska's Chemical Future" (Sept. 7, pp. 86-92), you created certain impressions which were not my intention. I refer particularly to the title and first few paragraphs of the published version, which decidedly give a pessimistic tone to the possibilities of chemical industry development in our new state. I do not question the fact that chemical industry development will be generally slow, but it is not fore-closed.

A few points of fact also suffered in your editorial treatment. The article states that "a healthy birth rate should push the population to 750,000 by 1975." Your implied salute to the virility of the present population undoubtedly is flattering. However, the statement in my original text was somewhat more qualified. Obviously, the anticipated rate of increase will be due to increasing in-migration which will swell the normal population increases to be expected.

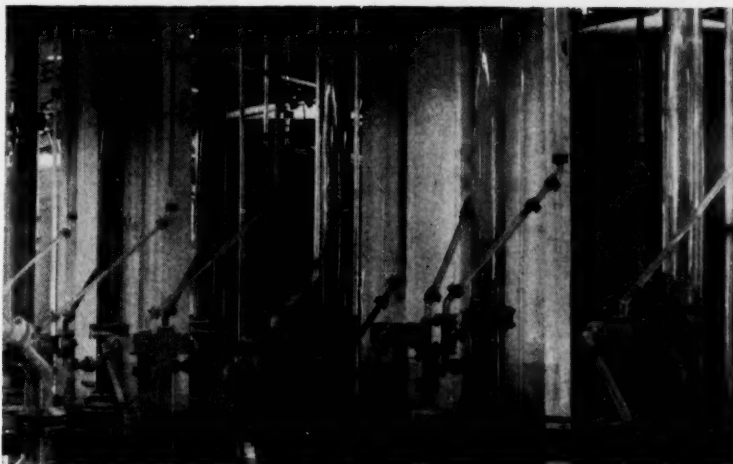
Alaska's coal reserves should be expressed as 100 billion tons, not 100 million. And the market for possible dry chars of the sub-bituminous (rather than bituminous) coals of the Railroad Belt would be in that area, including Anchorage as well as Fairbanks. You will recall, with regard to water transportation, that my original draft pointed to the \$8-million port improvement program now under construction at Anchorage.

Finally, I regret that space limitations necessitated deletion of the important interest and influence of Japanese markets in the development of Alaska's economy and of the extremely favorable legislation providing unusual incentives for industrial establishment in our big new state.

IVAN BLOCH

Industrial Consultant  
Portland, Ore.

## 4 WAYS TO USE GLASS IN THE PROCESS INDUSTRIES



**1. Zirconium maker uses 6-inch glass columns to get into commercial production.** At the Wah Chang Corporation's Albany, Oregon, plant you'll find an extraction system made up of PYREX brand glass columns, 6 inches in diameter and 50 feet high.

Zirconyl chloride enters the open end against a countercurrent stream of thiocyanate-rich methylisobutyl ketone. After hafnium is extracted, a countercurrent hydrochloric acid stream strips out any remaining zirconium in three 6-inch by 50-foot glass columns.

Finally, zirconium-free hafnium raffinate is scrubbed with sulphuric acid in more glass columns—6 inches in diameter and 55 feet tall. The scrubbed solvent then is recycled to the extraction columns and the aqueous solution of hafnium sulfate is neutralized with ammonium hydroxide.

Why PYREX brand glass No. 7740 for this processing? Because this is the glass that stands up to corrosive fluids. It is virtually unaffected by most acids or alkalis; there is no side reaction, no pickup. And with PYREX brand glass you have no worries about heat or mechanical shock. If you would like more facts about PYREX brand glass pipe or columns, write for a copy of PE-3.

**2. Heat, cool, and condense corrosive fluids in PYREX® modular shell and tube heat exchangers.** Your liquid will come in contact only with PYREX brand glass No. 7740, plus a chemically resistant ceramic, and TEFLON. You'll have no worry about build-up cutting efficiency, because glass is smooth. You can design systems to use multiple units, in parallel or series-parallel flow combinations. You have

low installation costs, because units are light in weight (the 50 sq. ft. capacity model weighs only 165 pounds). Mounting brackets are supplied. You can choose from models that take corrosives on tube side only, or on both tube and shell sides. Write for the facts today.

**3. No more plug-ups in glass waste-lines handling cellulose acetate dope.** Problem: Design a drainline system to handle sulfuric acid, acetic acid, and a cellulose acetate effluent. Complication: when "dope" overflows into the lines, water turns the fluid into a solid acetate flake that tends to plug. The solution: 220 feet of PYREX brand pipe. No problem with corrosion. No worry about shock from steam cleaning. And if dope does build up, it's visible. You take down only those sections you need, saving a great deal of time and effort. And you discover that the visibility and ease of cleaning of glass make it possible to use smaller diameter lines than with metal. The facts are in Bulletin PE-30.

**4. NEW PYREX brand Y-valve.** Now you can get a Y-valve for handling most fluids without corrosion or contamination. The valve comes in 1½" and 2" sizes—with 1" to be available soon. You get a tight seal, because a spring-loaded plug keeps TEFLON firmly against the seal. You can disassemble without removing the valve from the line. And you get extra strength, because the body is tempered, then armored with FIBERGLAS impregnated with a polyester resin. Use this valve to 50 psi, up to 250° F indoors, 175° F outdoors, with temperature differentials as high as 200° F. New Bulletin PE-4 gives details.



### CORNING GLASS WORKS

1 Crystal Street, Corning, N. Y.

CORNING MEANS RESEARCH IN GLASS

## MORE WAYS TO PROFIT FROM PLASTISOLS



*corrosion protection with Unichrome Plastisols*

# AVOIDS COSTLY MAINTENANCE

Impellers made of ordinary steel coated with plastisol withstand chemicals that even stainless steel impellers cannot. And it's practically "lifetime" protection for tanks lined with this baked-on vinyl coating. What better way to stretch service life of equipment; to cut out maintenance?

Spray or dip applied, Unichrome Plastisols provide a seamless, pore-free shield that safeguards against a whole host of corrosives. This resilient coating won't chip, resists abrasion. Costs less than applying vinyl sheet materials, too. Objects of any shape or size can be coated... so long as they can be maintained at baking temperature.

Expert applicators are strategically located to handle your equipment promptly. Or your own crews can do it. Send for Bulletin VP-3.



**coatings and finishes**  
**METAL & THERMIT Corporation**  
General Offices: Rahway, New Jersey

**TIMELY  
HELPFUL  
FREE . . .**

Timely, helpful, free. That's the kind of data, information and technical know-how that CE's Reader Service section can bring you.

Help yourself in this super-market of ideas. All you need is a pencil and a postcard.

Here's what's available: More information on any advertised products or service; Latest technical literature (p. 250); Additional details on new chemicals and equipment described in this issue (pp. 116-126).

As you read this issue—pencil in hand—circle numbers on your Reader Service card. Your selections will be mailed to you promptly by the manufacturers. It's a mighty handy way to keep up-to-date with what's new in processes and products.

And why not take advantage of our offer of a free reprint for your files. Just put a check mark in the free reprint box on the card.

*Chemical  
Engineering*  
**Reader  
Service**

**STARTS  
RIGHT  
HERE ▶**



For  
more  
information . . .

- Advertised  
Products
- New equipment
- New chemicals
- Technical  
Literature

Also . . .

- Reprints orders
- Subscriptions

Your Reader Service  
card is fastest

## WHERE'S THE OTHER CARD?

There were too  
many listings  
for our usual double  
card. Write  
for another if  
you need it.

FIRST CLASS  
PERMIT NO. 64  
(Sec. 34,9 P.L.&R)  
NEW YORK, N. Y.



BUSINESS REPLY CARD

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

— POSTAGE WILL BE PAID BY —

CHEMICAL ENGINEERING  
READER SERVICE DEPARTMENT  
330 WEST 42nd ST.  
NEW YORK 36, N. Y.

PLEASE TYPE OR PRINT

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City or State \_\_\_\_\_

## Help Yourself . . .

The postcard above can now bring you technical help, latest literature, expert guidance. Tear it out and, as you read this issue, circle numbers when you want more information; page numbers of ads; code numbers on editorial items.

You can also use this post-paid card to subscribe, or to make your selection from a comprehensive list of editorial reprints.

Be sure to fill in address blank before mailing postcard.

CIRCLE code numbers for more information. (This Nov. 16 issue card will expire Feb. 16, 1960.)

Cov	33-36d	62	101	124C	133f	160a	209f	237	254	270	297	331a	358	384
1	33-36e	63	103	124D	133g	160b	213	237A	255	TL271	299	331b	359	385
2a	33-36f	64	105	125	134	160c	215	237B	256	BL271	302-3	331c	360	386
2b	33-36g	65	109	126A	135	161	217	238	256A	BC271	305	331d	361	387
2c	33-36h	66	111a	126B	136	162	219	238A	257	R271	306	331e	362	389-90
2d	33-36i	67	111b	126C	137	163	221	238B	258	272	307	331f	363a	391
2e	33-36j	68	113	126D	138	164	222	238C	259	274	308	331g	363b	392
2f	33-36k	69	115	127	139	165	223	238D	R260	L275	309	331h	363c	393
4	37	70	116A	128	140	170	224	238E	R261	R275	310-11	331i	363d	394
6-7	38-39	71	117a	129-130a	141	171	225	239	262	276	312	331j	363e	395
8-9	40-41	72	117b	129-130b	142	172	226	239A	TL263a	L277	313	332	364	396
10-11a	42-43	73	117c	129-130c	143	173	227	239B	TL263b	R277	314	333	365	397
10-11b	44-45	74-75	118A	129-130d	144	174	228	239C	TL263c	278	315-318a	334	366	398
10-11c	46-47a	76	118B	129-130e	145	197	229	240	TL263d	L279	315-318b	335	367	399
16-17	46-47b	77-78	118C	129-130f	146	199a	230	241	BL263	R279	315-318c	337	368-9	400
18-19	46-47c	79	119	129-130g	147	199b	231	242	R263a	280	315-318d	338	370	401
20-21	46-47d	80a	120A	129-130h	148	199c	232	243	R263b	289a	315-318e	339	371	402
22-23	46-47e	80b	120B	129-130i	149	199d	232A	T244	R263c	289b	320	341	372	403
24-25	46-47f	81	120C	129-130j	150	199e	232B	B244	264a	289c	321	342-3	373	404
26-27	46-47g	82	120D	131a	151	201	233	245a	264b	289d	322	344	374	405
28-29a	48-49	83	120E	131b	152	203	233A	245b	TL265	289e	323	345	375	406
28-29b	50-51	84	121	131c	153	205	234	245c	BL265	289f	324	346-7	377	407
28-29c	52a	85	122A	132	154	207	234A	245d	R265	289g	325	348	378	408
28-29d	52b	86	122B	133a	155	209a	235	246	266	289h	326	349	379	419
30-31	53-56	88	122C	133b	156	209b	235A	250	TL267	289i	327	350	380	422a
32	57	93	123	133c	157	209c	235B	251	BL267	291	328	355	381	422b
33-36a	59	95	124A	133d	158	209d	236	252	268	293	329	356	382	423
33-36b	60	99	124B	133e	159	209e	236A	253	269	295	330	357	383	424
33-36c	61													

## PAGE NUMBERS ARE KEY NUMBERS

Circle for more information about . . .

- ADS
- PRODUCTS  
page 44
- EQUIPMENT  
page 50
- SERVICES
- LITERATURE  
page 148

## WHERE'S THE OTHER CARD?

There were too many listings for our usual double card. Write for another if you need it.

REPRINTS: Circle what you want. (See opposite page for description.) Send no money, we'll bill you later.

21	25	28	37	40	42	45	46	47	49	52	54	55	57	61	62	63	64	66	67	68	70
72	73	74	75	78	79	80	81	82	83	85	86	87	89	90	91	92	93	94	95	96	97
98	99	100	101	102	103	107	108	109	110	111	112	113	114	115	117	118	119	120	121	122	124
125	126	127	128	129	130	131	132	133	134	135	136	138	139	140	141	142	143	144	145	146	147

FREE REPRINT: Check here ☐ for your file copy of this issue's free reprint (p. 195) FC-23

## Want More Data?

Use this postcard for catalogs . . . for more information on equipment . . . on materials . . . on advertised items . . . for helpful reprints of editorial articles. Be sure to fill out the other side of card. *Important—For pages showing more than one advertised item, use this guide to numbers on card above.*

- 2a—High speed continuous solid bowl
- 2b—Oscillating screen centrifuge
- 2c—Continuous solid-bowl centrifuge
- 2d—Rotary vacuum filters
- 2e—Horizontal pan type vacuum filters
- 2f—Suspended batch centrifuges
- 33-36a—Gearchem pumps series 400
- 33-36b—Gearchem pumps series 700
- 33-36c—All-Chem pumps—PP1M & PP2M
- 33-36d—New addition to line
- 33-36e—Explosion proof pump units
- 33-36f—Manilab HCT rotary pump
- 33-36g—Multi-purpose bronze displacement pumps
- 33-36h—Centri-Chem centrifugal pumps
- 33-36i—T-Film thread sealing compound

- 33-36j—Safety chemical dispensing valves
- 33-36k—Gear-Vac valves
- 131a—Aluminized steel type 2
- 131b—Precipitation-hardening stainless steel
- 131c—ELC stainless steels
- 209a—Double arm mixers
- 209b—Pony mixers
- 209c—3-Roll mills
- 209d—Hy-R-Speed mills
- 209e—Ribbon blenders
- 209f—Ro-Ball sifters
- R263a—Control
- R263b—Midget iron tester
- R263c—Water analyzer
- 289a—Filter presses of metals, wood, plastics, rubber
- 289b—Vertical tank, horizontal plate filter
- 289c—Horizontal tank, vertical leaf pressure filter

- 289d—Vertical tank, vertical leaf pressure filter
- 289e—Plate & frame type continuous thickener
- 289f—Horizontal tank, vertical leaf frame pressure filter
- 289g—Plastics polymerizer & slabb
- 289h—Filter media: textile, paper, metal
- 289i—Diaphragm pump for difficult fluids
- 315-18a—Turbulizer
- 315-18b—Ribbon blender
- 315-18c—Pulvocron
- 315-18d—Customizer processing system
- 315-18e—Production testing service
- 331a—Sulfur dichloride
- 331b—Sulfur monochloride
- 331c—Chlorinating agents
- 331d—Chlorine
- 331e—Sulfuryl chloride
- 331f—Handling phenol
- 331g—Thionyl chloride
- 331h—Muriatic acid
- 331i—Phenol
- 331j—Oxalic acid
- 422a—Trailer
- 422b—Horizontal batch mixer

Use this handy coupon to order your personal subscription to Chemical Engineering. No need to send any money now. We'll bill you later.

Send CE for ☐ 1 yr. at \$3, ☐ 3 yr. at \$5 (U. S. rate only)

To

For Subscriptions: To apply, check here.

(Pay when billed) Where to send subscriptions.

# EDITORIAL REPRINTS

CE editorial reprints are now easy to get. Here's a listing of what's available. Now you can order—while they last—whatever you need to make your personal files more valuable.

## ORDER NOW:\*



Use Reader Service Card for fast service. For each reprint you want just circle its numbers on the card. Fill in the blanks on the front, mail. Send no money, we will bill you later.

### • Unit Operations

Binary Distillation—Theory, equipment (75¢).....	54
Compressible Fluids—How to handle (\$1).....	80
Crystallization—For purification (50¢).....	124
Drying—Methods, equipment, design, costs (75¢).....	70
Entrainment Separation—Equipment & performance (75¢)	37
Foams—How to use and how to control foams (50¢)....	86
Gas Purification—Today's processes (\$1).....	140
High Temperature Technology—Materials, processes (50¢)	91
Ion Exchange—A chronicle of remarkable advances (75¢)	55
Liquid-Gas Contacting—A practical operation study (75¢)	82
Mixing—Understand this universal operation (75¢)....	47
Process Control—Up-to-date instrumentation report (\$1).	95
Size Reduction—Major pieces of equipment (50¢)....	25
Solids Concentration—Survey of techniques (50¢).....	67
Solids-Gas Contacting—Integrated background (50¢)....	63
Solids-Liquid Separation—Basic know-how (\$1).....	62

### • Equipment

Computers—Digital & analog (50¢).....	145
Control Valves—How to select yours (75¢).....	141
Conveyors & Elevators—Solving bulk moving (50¢)....	46
Heat Exchanger Design—Timely shortcuts (75¢).....	52
Heat Exchanger Calculations—12-part series (\$1).....	136
Instruments—"Hardware" section of Report 95 (50¢)....	96
Mechanical Seals—How to select and use them (50¢)....	83
Piping—Roundup of process pipe, valves, fittings (75¢)..	40
Pumps—How to pick the one you need for your job (50¢)	21
Pump Seals—How to select the best (50¢).....	92
Solids Feeders—How to lick feeding troubles (50¢).....	28

### • Materials of Construction

Corrosion—Refresher on cause & cure (\$1).....	131
High-Temperature Materials—Inorganic, nonmetallic (75¢)..	120
Lead Installations—Best designs for many uses (50¢)....	79
Metals for High Temperatures—18th Biennial report (\$1) 129	
Nonmetallic Inorganics—For severe conditions (50¢)....	125
Plastic Pipe—How and when to use (75¢).....	135

### • Processes

Biochemicals Processing—The total picture (50¢).....	93
Bio-oxidation—Theory, design, practice (50¢).....	68
Chemicals From Petroleum—Available processes (\$1)....	139
Extractive Metallurgy—Via chemical engineering (50¢)..	111
Extremely Low Temperatures—Production and uses (50¢)	133
Formulation—Its chemical technology (50¢).....	74
Manufactured Gas—To supplement natural gas (50¢)....	115
Moving Bed Processes—Application plus theory (75¢)....	64
Odor Control—How to be a good neighbor (50¢).....	98
Process Energy—Make or buy? (50¢).....	142

### • Costs and Other Timely Topics

Air Pollution—How to cope with problems (50¢).....	143
Cost Control Systems—How to build your own (50¢)....	102
Flowsheets—How to speed communications (50¢).....	99
Flow File—50 formulas (50¢).....	112
Inflation—How to predict the shrinking dollar (50¢)....	78
Liquefied Compressed Gases—How to handle (50¢)....	147
Modernization—Plan '59 for profits (75¢).....	128
Nuclear Industry—The role of chemical engineers (50¢)..	89
Operation & Maintenance—The impact of trends (\$1)....	121
Patent Fundamentals—Timely review (50¢).....	114
Pilot Plants—All the aspects of scale-up (\$1).....	127
Processes & Technology—Eighth Inventory 1958 (50¢)..	118
Professional Registration—For PE-minded ChE's (50¢)...	85
Rockets & Missiles—Airborne reactor problems (75¢)....	119
Safe Handling of "Reactive" Chemicals (50¢).....	134
Speculative Process Design—Pilot plant bypass (50¢)....	146
Statistics—How to use data effectively (75¢).....	73
10 Top Chemicals—Current trends (50¢).....	132
Water Pollution Control—To cope with problems (50¢)..	122

## New and Popular Series . . .

<b>Estimating Engineering Properties.</b> By Wallace R. Gambill.	
Thermal Conductivity (50¢)...	94
Heat Capacities (75¢).....	109
Latent Heat (75¢).....	117
Surface Tension (75¢).....	126
Viscosity (75¢).....	138

<b>Your Design Reference File.</b> By Ralph Cushing.	
Parts I-V (75¢).....	100
Parts VI-IX (75¢).....	110

<b>Flow Through Packing and Beds.</b> By Max Leva.	
Packed Towers (50¢).....	103
Fixed and Moving Beds (50¢).....	107
Fluidized Systems (50¢)....	108

### CE Refresher

Thermodynamic Principles (50¢).....	42
Compression & Expansion (50¢).....	45
Chemical Equilibrium (50¢)....	49
Homogenous Kinetics (50¢)....	57
Catalytic Kinetics (50¢).....	61

Interpreting Kinetics (50¢)...	66
Simple Reactor Design (50¢)...	72
Complex Reactor Design (50¢)...	75
Catalytic Reactor Design (50¢)...	81
Reactor Design Problems (50¢)...	87
Physical Equilibrium I (50¢)...	90
Physical Equilibrium II (50¢)...	97
Fluid Flow Equations (50¢)....	101
Fundamental Math (75¢).....	113
Mass Transfer Operations (\$1)...	130

<b>Unit Operations Refresher</b>	
Fluid Flow (50¢).....	144

\*Don't forget to ask for your copy of this issue's free reprint feature (p 195).



From ¼ hp  
to 75 hp

**ready now  
to solve your  
pumping problems**

## Ingersoll-Rand MOTOR PUMP

WHEN YOUR IMPORTANT PRODUCTION depends on proven pumping power, you need the efficiency and reliability of I-R Motorpumps! Low maintenance and minimum down-time mean cost-cutting operation that continues to pay off year after year.

I-R Motorpumps are always available in the widest range of types and sizes for every type of installation. Capacities from 5 to 2800 gallons per minute; heads to 650 feet.

Compact Motorpumps are easy to install. They operate in any position, save valuable floor space. Write today for specifications and performance data.

**Ingersoll-Rand**  
9-827 11 Broadway, New York 4, N. Y.

### READER SERVICE . . .

## TECHNICAL

### Contents of This Issue

Chemicals . . . . .	251
Construction material . .	252
Electrical & mechanical	256
Handling & packaging .	258
Heating & cooling . . . .	260
Instruments & controls .	261
Pipe, fitting, valves . . .	264
Process Equipment . . . .	268
Pumps, fans, compressors	274
Services & miscellaneous	278

### Chemicals

**Acid Inhibitor** . . . . . has been made odorless, without changing inhibiting properties of product. Material added in small amounts to acid pickling solutions. No. 1537.

\*U. S. Industrial Chemicals Co.

**Activated Carbon** . . . . . is a versatile liquid & gas purifier. All types are manufactured. Literature J-103 contains additional information. Available on request.

252 \*Barnebey-Cheney

**Chemicals** . . . . . New KA-101 active Aluminas for the petroleum & chemical industries. The technical brochure "Kaiser Aluminas" is now available on request.

239 \*Kaiser Chemicals Div.

**Chemicals** . . . . . Comprehensive description of properties & applications of more than 400 chemicals is contained in 1959 Physical Properties of Synthetic Organic Chemicals.

111b \*Union Carbide Chem. Co.

**Chemicals** . . . . . Peroxygen is a word used to indicate how oxygen can be tied into just about anything. Complete information about Peroxygen Chemicals is available.

133f \*Becco Chemical Div., FMC

**Chlorine** . . . . . New data sheet gives properties, shipping information and uses for liquid chlorine in detail. Includes complete references for property data.

129-130c \*U. S. Industrial Chemicals Co.

**Diatomites** . . . . . Cellite diatomite is offered in a choice of 9 intermediate grades plus many special grades. Information on specific filtration & mineral filler problems.

37 \*Johns-Manville

**Filter Aid** . . . . . Solka-Floc is virtually 100% pure cellulose & offers more advantages as a filter medium in many food processing applications. Facts available.

237 \*Brown Co.

\* From advertisement, this issue



## LITERATURE

E. M. FLYNN

**Fluorinating Agents.**....An extremely wide range of fluorinating agents in research or commercial quantities can be provided. Further information on request.

93 \*Allied Chem., General Chem. Div.

**Fluorocarbon Resins.**...are unaffected by HCl liquid & vapors, fuming nitric acid-whit or red-hydrofluoric acid, organic solvents & reagents. Information.

95 \*E. I. du Pont de Nemours & Co.

**Glycerine.**....New 20-page booklet describes properties, reactions, and performance. Includes information on storage, shipping, handling. No. 1530.

129-130d \*U. S. Industrial Chemicals Co.

**Methionine.**....Preliminary study by Russian researchers indicates that methionine has a therapeutic effect in the treatment of schizophrenic patients.

129-130b \*U. S. Industrial Chemicals Co.

**Monomer.**....The newest acrylate monomer, 2-ethylhexyl acrylate is now available in commercial quantities to meet all your needs. Additional information on request.

113 \*Celanese Corporation of America

**Montmorillonite Catalysts.**....made from bentonite and aluminum hydrosilicate now marketed in the U. S. Characterized by highly selective catalytic activity. No. 1532.

129-130e \*U. S. Industrial Chemicals Co.

**Pentanedione.**....Technical bulletin containing many suggestions for applications is available. Lists physical properties, specifications & shipping instructions.

111a \*Union Carbide Chem. Co.

**Sodium Borohydride.**....is remarkably stable & is easily used with complete safety in standard equipment. Shipped in polyethylene lined, 55-gal. drums. Technical publications.

119 \*Metal Hydrides Inc.

**Titanium Alloys.**....Research program to determine the corrosion resistance of seven titanium alloys has recently been completed. Results available.

129-130a \*U. S. Industrial Chemicals Co.

\* From advertisement, this issue

Want to build up your files and keep them up-to-date? You can get any publication in this comprehensive guide — free — just for the asking.

It's easy — simply circle item's number on the Reader Service Postcard and mail. Replies will come directly from companies offering the literature.

# newest ELLIOTT tube cleaner

*lightweight! air-driven!*



**PISTOL-GRIP**  
easy  
to handle  
by  
one operator

**CHROME-MOLY  
SHAFTING**  
(Aircraft  
quality)  
for greater  
strength  
and  
rigidity

**FLUSHING  
ACTION**  
hole near  
drill tip  
for cooling  
and  
flushing water

## for condenser and heat exchanger tubes

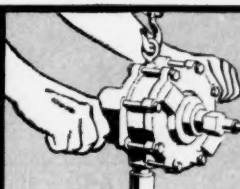
Lightweight. Powerful. Air-driven. Trigger-action control with speed governor to prevent shaft-whip. High-speed motor reduced through planetary gears to 1500 rpm. Integral

water-feeding attachment with finger-action valve which controls flow of cooling water into hollow shaft and drill or brush. Built-in oil reservoir. Send for tube cleaner bulletin Y-48.



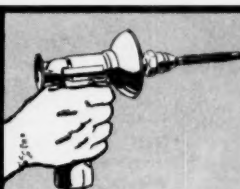
### DRILLS AND BRUSHES FOR VARIED NEEDS

Brushes for light deposits. Four types of drills clean light, hard-heavy, hard-light, and gummy deposits.



### SUSPENSION TYPE

Air, steam or electric heavy-duty motor, for removing hard, heavy deposits. Ball bearings absorb thrust in either direction.



### ELLIOTT JIFFY GUN

For extra-fast cleaning of light deposits in tubes 1/2 in. to 1 1/4 in. Air or water pressure shoots nylon brushes or rubber plugs through tubes.



**ELLIOTT Company**

Lagonda Plant — Springfield, Ohio

Y9-1



Using the positive  
gas mask principle,  
**ACTIVATED CARBON**  
is the most versatile  
liquid and gas purifier.  
Barnebey-Cheney is  
the only manufacturer of  
**ALL** types of activated carbons.  
It's the only business we know...  
and we know it well.

	<i>natural grain sizes</i>	<i>pelletized</i>	<i>powdered</i>
nut shells	✓	✓	✓
wood	✓	✓	✓
coal	✓	✓	✓

Ask for literature J-103. Send us your problem to solve.  
Barnebey-Cheney, Columbus 19, Ohio.

# Barnebey Cheney

## LITERATURE . . .

### Construction Material

**Alloys.**.....Description booklet contains full details on Tantalum. Produced by the consumable-electrode process. Practically inert to a wide variety of corrosive media. 217 \*Haynes Stellite Co.

**Aluminum Bus Conductor.**....handles easier & requires less costly supporting structures. Easier to bend & form to your needs. Handbook is offered. \*Aluminum Co. of America

**Castables.**.....Bul. 1992 offers details on castables for high temperature processing. Provide up to 3300 F. Small, lightweight bubbles or dense grains. 46-47c \*Norton Co.

**Catalysts Carriers.**.....A full line of catalyst carriers to meet the requirements of a wide range of feedstocks & thermal conditions. Bul. #7 gives full details. 46-47a \*Norton Co.

**Cements.**.....Three different heat-resisting, chemically-inert materials carefully blended to assure proper grit-size distribution. Catalog 863 provides information. 46-47d \*Norton Co.

**Chemical Castings.**.....are engineered to your specific requirements. Complete details in the illustrated brochure and facilities list which is offered.

243 \*Bethlehem Foundry & Machinery

**Clad Steels.**.....Application Engineers have documented cases covering a wide range of materials selection problems to help choose the right steel plate. Bulletin offered. 79 \*Lukens Steel Co.

**Coating.**.....The Kanigen process for chemical nickel alloy plating produces a uniform thickness of coating, regardless of the contours of a part. Tech. details in Bul. 258. 63 \*General American Transportation

**Coatings.**....."D-A" Coatings are applied by brush or spray & can be air dried or baked. Will withstand temperatures up to 600 F. Catalog MPC outlines all coatings. BL267 \*The Markal Company

**Coatings.**.....Unichrome Plastisols when either spray or dip applied provide a seamless, pore-free shield that safeguards against a whole host of corrosives. Bul. VP-3. 246 \*Metal & Thermit Corp.

**Coatings, Ceramic Spray.**.....Hard crystalline materials which can be applied to a wide variety of base materials. Bulletins now available on request. 46-47e \*Norton Co.

**Fabrications.**....Catalog 57 gives helpful, practical information on research, engineering & product services for better methods of solids-liquid separation. 308 \*Multi-Metal Wire Cloth Co.

**Fused Quartz.**....Vitrosil is available in an unusually wide variety of types & sizes. Offers extreme heat resistance & outstanding electrical properties. Tech. Data.

R265 \*Thermal American Fused Quartz

\* From advertisement, this issue

# TAKING IN THE CHEMICAL SHOW?

## See

the actual Super-Seal  
open motor that  
withstood two years of  
acid atmosphere  
without adverse effect.

## See

a dielectric heater  
processing chemicals-see your  
own product tested-bring a small  
sample and we'll run it.

## See

the Vibrating Ball Mill  
in operation-this  
"little giant" used in batch  
operation or as the heart of  
a dry grinding plant,  
out-produces a conventional  
tumbling mill twice its size.

## See

pumps  
galore--vertical  
and horizontal,  
general and  
special, for  
handling most  
any liquid.

**...and see more** --much more--at the  
Allis-Chalmers Chemical Exhibit in New York, Nov. 30 to  
Dec. 4, Booths 636 to 646. Make it a "must see!"

**ALLIS-CHALMERS**



A-1199-C



## 5172-GS-B set

(1/4 to 1 1/4-inch wrench size range)

Service factory machinery, engines, cars, trucks, plant utilities and material handling equipment with this handy set of *Snap-on* tools.

Space-saving compactness puts 172 tools in one portable, "quick-select" chest. Sturdily built from welded, heavy-gauge steel, the chest is easily transported from tool crib to job, from plant to field service — wherever it's needed.

The kit is complete enough to handle practically all of your general service requirements. And top-quality *Snap-on* tools fit better, last longer — cost you less in the long run.

We can also help solve your maintenance and service problems with specially tailored sets to meet your needs. Call the nearest *Snap-on* branch for more information — or write direct.

## NEW SAFETY FILM

A new *Snap-on* tool safety film is now available for showing in your plant. Write us and schedule it for mechanics and safety supervisors soon.



**SNAP-ON TOOLS**  
CORPORATION

8106-K 28th Avenue • Kenosha, Wisconsin

## LITERATURE . . .

**Gasket Material . . . . .** Booklet fully describes "Armalon" felts. Includes complete data on characteristics, detailed list of specific applications, information on sizes, etc.

151 \*E. I. du Pont de Nemours & Co.

**Hard Carbide Alloys . . . . .** Booklet B-111A, "Characteristics of Kennametal." Booklet B-222, "Designing with Kennametal." Booklet B-444A, "Ktantium" are offered.

R279 \*Kennametal Inc.

**Insulation . . . . .** Calsilite, one-layer insulation for soaking heat up to 1250 F. Lightweight & easy to cut & mitre. Absorbs moisture without disintegration. Details.

L275 \*The Ruberoid Co.

**Insulation . . . . .** Foamglas is completely impervious to liquids & vapor. It can't burn & is acid-proof. Complete details contained in the Industrial Insulation Catalog.

16-17 \*Pittsburgh Corning Corp.

**Insulation . . . . .** Thermafil is exceptionally light in weight permitting easy & fast application. Unaffected by water or weather; has high structural strength. Catalog.

158 \*Baldwin-Ehret-Hill, Inc.

**Laboratory Ware . . . . .** Catalog 793 covers Alundum ware which has been used successfully for many years in laboratory development, experimental & analytical work.

46-47g \*Norton Co.

**Porous Media . . . . .** A wide selection of porous media for filtration, diffusion, or aeration. Made of strong chemically stable fused alumina. Catalog #140.

46-47b \*Norton Co.

**Refractories . . . . .** There is a wide range of products to meet the requirements of almost every type of application. Copy of "Super Refractories by Carborundum".

152 \*The Carborundum Co.

**Resin . . . . .** A wide variety of resin formulations to provide complete protection under almost any condition. Solve your corrosion & contamination problems. Bul. 100.

271 \*Du Verre, Inc.

**Rubber . . . . .** Butyl rubber offers impermeability to gases, moisture & moisture vapor. Offers resistance to sunlight & weathering . . . chemicals . . . heat, etc.

121 \*Enjay Company Inc.

**Silicon Carbide . . . . .** Crystolon silicon carbide products are available for processes involving heat transfer and abrasion resistance. Catalog

862. 46-47f \*Norton Co.

**Stainless . . . . .** No. 20 & 20Cb are as easily fabricated as ordinary stainless steels. Forms, sizes & shapes for most corrosion problems. Tech. bulletin 108A.

83 \*Carpenter Steel Co.

**Stainless Steel Castings . . . . .** The complete brochure, "Foundry Work—Steels, Alloys & Non-Ferrous" is available. Castings up to 10,000 pounds.

262 \*Service Foundry Div. of Avondale

**Tantalum Equipment . . . . .** Acidproof Tantalum equipment including Thermowells, Bayonet Heaters and Condensers is now available from stock. Details.

205 \*Fansteel Metallurgical Corp.

\* From advertisement, this issue



SCOPE in MOTOR  
DEVELOPMENT from ...

**ALLIS-CHALMERS**

**ACID AREA APPLICATION.** Safety equipment and clothing are a "must" for personnel in the acid atmosphere of Dow's chlorine plant at Freeport, Texas. This Super-Seal motor came prepared, too — with Poxeal insulation guarding the stator.

## 2-YEAR ACID TEST!

Open motor beats enclosed type  
at its own game

**In a tough acid pump installation,** Dow Chemical's Texas Division experienced no end of motor troubles. It seemed nothing could stand up in that humid, corrosive atmosphere. Reports Dow: "Even with totally enclosed motors, winding failures were frequent." And, they might have added, expensive.

**Then came Super-Seal motors —** Allis-Chalmers open-type motors with amazing Poxeal insulation. A durable case of epoxy-resin encloses the winding end turns and slot portions of the stator ... the

most complete protection ever developed. Result? The *Super-Seal* motor, after two years of continuous operation in the acid area, is as good as ever. So good, in fact, that Dow has ordered 150 *Super-Seal* motors for a new chemical plant at Freeport, Texas.

**Isn't it time** to reevaluate your motor standards? There's a good chance that costly enclosed motors are no longer needed. Contact your A-C representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Super-Seal and Poxeal are Allis-Chalmers trademarks.

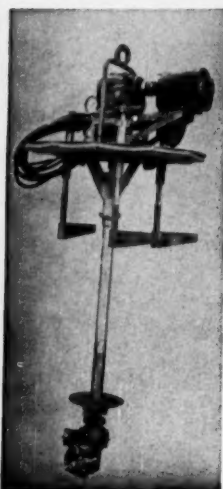


A-1036-C&P





**This man, cleaning a tank-truck interior  
of alkyd resin deposits, accomplishes**



Oakite Interior Tank Cleaning Unit, Model 531. Automatically sprays hot cleaning solution under pressure. Nozzles rotate vertically and horizontally. Rinses after cleaning. Sprays 45 gal/min at 150 lbs. pressure.

## 18 hours cleaning in 1 hour

At a New England chemical plant, it used to take three men working six hours to clean out each truck tank—two men inside the tank scrubbing, scraping and sloshing, one man astride the dome to watch in case the oxygen tanks gave out. Even at that, a careful inspection was needed to make sure the tank was properly clean.

That's how it was. Now, one man equipped with the Oakite 531 Interior Tank Clean-

ing Unit, using a cleaning solution recommended by the local Oakite representative, does the whole job in one hour flat. A sweet job, too, with the tank interior shining like new.

It's just one of the many ways Oakite methods and materials save time and money in chemical plants . . . and why you may find it well worth your while to call in your local Oakite man. Meanwhile, for details about Oakite tank cleaning equipment and Oakite cleaning methods for the chemical industry, write to Oakite Products, Inc., 16H Rector Street, New York 6, N. Y.

Technical Service Representatives in Principal Cities of U. S. and Canada

Export Division Cable Address: Oakite



In our 50th year.

### LITERATURE . . .

**Teflon** . . . . A new ready-reference book illustrates & describes the broad range of packings, gaskets, sheets, tapes & other components made of Chempac Teflon.  
149 \*Johns-Manville

**Titanium** . . . . Detailed results of a comprehensive test undertaken to confirm titanium's outstanding corrosion resistance are now available in a summary report.  
337 \*Union Carbide Metals Co.

**Wire Cloth & Screen** . . . . for filtering, straining, sizing, etc. Helps produce a better, more uniform product. Condensed Screen Reference Catalog is offered.  
227 \*Ludlow-Saylor Wire Cloth Co.

### Electrical & Mechanical

**Accelerator** . . . . Complete engineering & technical advantages of the new Dynamitron Accelerator are offered. Feature many low cost irradiation applications.  
329 \*Radiation Dynamics, Inc.

**Bin Vibrators** . . . . The new electro-permanent magnetic H1-V1 bin vibrators feature completely enclosed housing. No rectifier needed. Catalog.  
256A Eriez Mfg. Co.

**Drives** . . . . New Magnetic Drive offers precise regulation, compactness & design flexibility for adjustable speed drives up to 2000 hp. Bulletin 3650.  
305 \*The Louis Allis Co.

**Expansion Joint** . . . . The "XJ" Conduit Expansion Joint features a metallic packing & pressure ring at the flexible end to keep the joint weatherproof at all times.  
88 \*Appleton Electric Co.

**Expansion Joints** . . . . stay flexible when handling the most severe chemicals. Recommended for certain chemicals such as Aniline-R.T., Diethyl Sevacate-R.T. etc.  
213 \*United States Rubber

**Gaskets** . . . . Guardian gaskets assure safe, positive sealing against practically all chemicals at temperatures from -300 F. to +450 F. Folder AD-104.  
70 \*The Garlock Packing Co.

**Mechanical Seal** . . . . Seal faces are adjustable externally by single set screw arrangement without dismantling the seal or pulling pump shaft. Bulletin CP 551.  
362 \*Chemical & Power Products, Inc.

**Mechanical Seals** . . . . meet a wide range of pressures, temperatures & liquids. Sealing of corrosive, volatile & abrasive conditions. Catalog No. 480 CE.  
386 \*Durametallic Corporation

**Motors** . . . . Complete information on the dependable Life-Line "A" motors and how they pay for themselves through reduced maintenance & repair is available.  
26-27 \*Westinghouse Electric Corp.

**Motors** . . . . Type EP can meet your requirements for motor drives that must operate under adverse conditions. Available in ratings through 500 hp. Bul. MU-224.  
136 \*Wagner Electric Corp.

\* From advertisement, this issue

SCOPE of PUMP  
DEVELOPMENT from...

**ALLIS-CHALMERS**



**POXEAL insulation** system of Super-Seal motors provides a stator completely impervious to contaminating elements. Result: A close-coupled pump with an open-type motor that can "take" the toughest atmospheres.

## You can save up to 20% on close-coupled pumps

**Capacities to 2500 gpm, heads to 550 ft.**

Now from Allis-Chalmers: close-coupled pump units powered by *Super-Seal* motors with *Poxeal* insulation!

You can save up to 20% by specifying these units. Reason: Open-type *Super-Seal* motors may be used in many areas previously requiring more costly enclosed motors.

In addition to moisture-defying *Super-Seal* motors, these pump units offer heavy-duty construction, easily replaceable wearing rings, balanced impellers, plus other quality pump features. It all adds up to a cost-saving pumping package for a wide variety of installations.

**Contact** your A-C representative or distributor for coordinated pumping equipment — pumps, motors, control and drive. Or write *Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.*

Super-Seal and Poxeal are Allis-Chalmers trademarks.



A-5883-C

# NEW FROM KIDDE!



2½-gallon  
pressurized water

2½-gallon  
anti-freeze (loaded stream)

## The easiest-to-operate portable fire extinguishers on the market today!

Here, for the first time, is a practical, sensible design for pressurized water and loaded stream extinguishers. No inverting, no bumping, no valves to turn, no pins to pull (safety lock automatically releases when nozzle removed).

These two new stainless steel Kidde portables feature simple, one-two operation—just aim at fire and push the button. Notice the way the hose is stored, safely out of the way. Notice the wide-open handle—to insure fast action even in gloved hands. Notice the dust-and-waterproof pressure gauges—which show at a glance whether the units are fully charged. All of the features—plus the slim design and light weight of these Kidde portables—make them the easiest-to-store, easiest-to-carry, easiest-to-operate portables on the market today.

Approved by Underwriters' Laboratories. Available in pressurized water for fires in ordinary combustibles, or anti-freeze loaded stream for fires in ordinary combustibles and flammable liquids. For more information, write to Kidde today.

# Kidde



**Walter Kidde & Company, Inc.**  
1128 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd.,  
Montreal—Toronto—Vancouver

The words 'Kidde', 'Lux', 'Lux-O-Matic'.

'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

### LITERATURE . . .

**Motors, Open-Type**.....with Poceal insulation. A durable case of epoxy-resin encloses the winding end turns & slot portions of the stator. Information.  
225 \*Allis-Chalmers

**Semiconductor Rectifier**.....Unitron offers voltage equalization, current equalization, random cell selection & water cooling. Available in any desired d-c voltage.  
403 \*I-T-E Circuit Breaker Co.

**Solenoid Starter**....The use of ONLY one moving part assures you of millions of trouble free operations. Bulletin 709 Size 1 Solenoid Starter.  
81 \*Allen-Bradley Co.

**Starters**.....Complete details on the 2200-4800 volt starters is now available. Throughout the entire sequence, motor windings are completely protected. Bul. 8210.  
423 \*The Electric Controller & Mfg. Co.

**Swivel Joint**....Interchangeable packing feature enables DS Series to handle a wide range of chemicals in services from -65 F to +400 F at 300 PSI. Bul. No. 1258.  
155 \*Chiksan Company

**Swivel Joints**.....US type are designed exclusively for the chemical industry. Stop grease contamination of fluids. Can be repaired on location with simple tools. Catalog.  
291 \*Continental-EMSCO

**Thermocouples**.....Catalog 34-E contains complete information on how "CERAMO" thermocouples can help improve your process controls. Available now.  
123 \*Thermo Electric Co., Inc.

**Tube Cleaner**.....The new lightweight, air-driven tube cleaner for condenser & heat exchanger tubes is outlined in Bulletin Y-48. Easy to handle by one operator.  
251 \*Elliott Co.

**Turbines**.....A complete range of power-packed turbines, from 1 HP to 250 HP. Built to customer specifications. Further facts on turbines in new Catalog 200.  
147 \*Coppus Engineering Corp.

**Variable Speed Drives**.....Controllable from 3 to 15 psi, 0.5 to 5 ma, or signals from any electrical transducer. Utilizes analog, frequency or parallel binary signals.  
L277 \*Graham Transmissions, Inc.

**Variable Transformers**.....The H-C series offer high current capacity & extremely fine adjustment. Feature zero waveform distortion, excellent regulation, etc.  
77-78 \*The Superior Electric Co.

### Handling & Packaging

**Automatic Proportioning System**.....Select-O-Weigh incorporates such units as Feeders, Scales, Controls and Readout. Full details on how you can automate your processing.  
270 \*Richardson Scale Co.

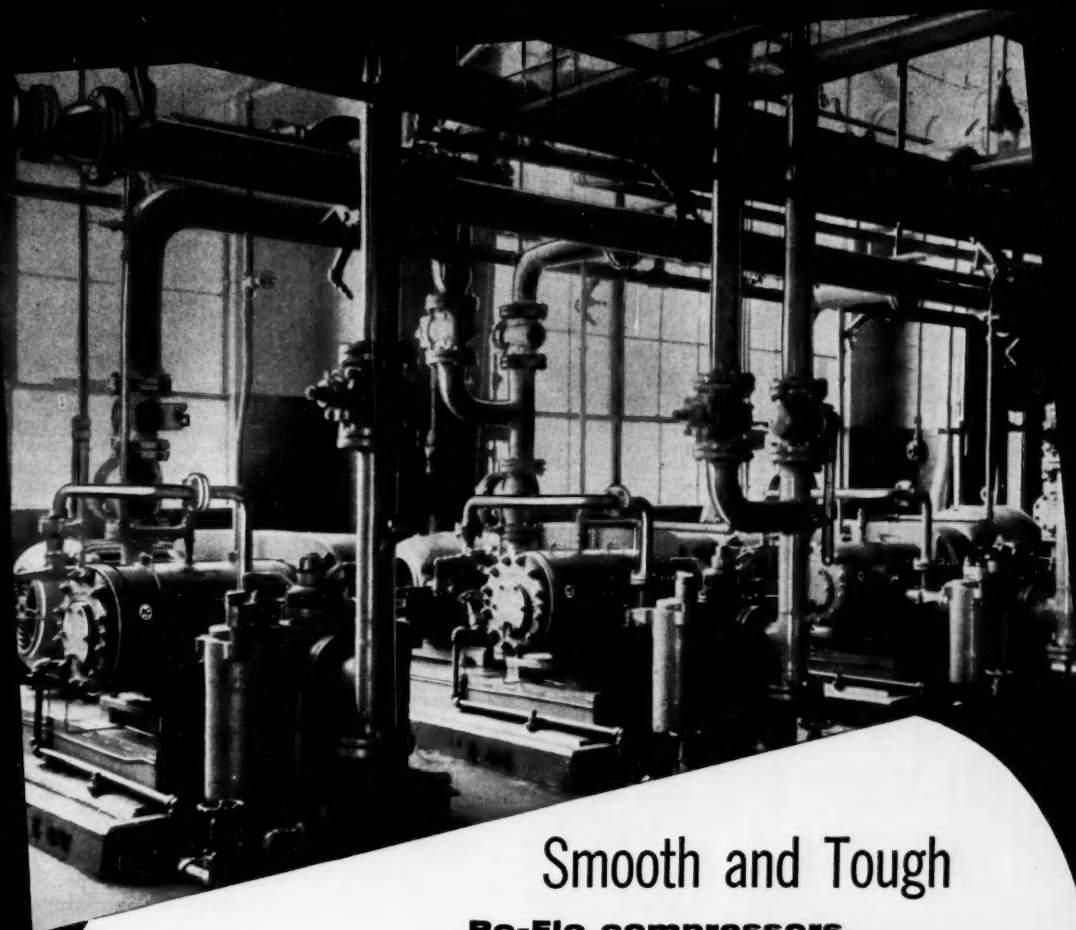
**Bulk Handling System**.....Tote is a complete mechanical automatic system based on metal containers plus filling & discharging equipment. Details in catalog.  
335 \*Tote System, Inc.

\* From advertisement, this issue



Full SCOPE of  
COMPRESSORS from...

**ALLIS-CHALMERS**



## Smooth and Tough

**Ro-Flo compressors  
eliminate underlying causes  
of high maintenance**

*Ro-Flo* compressors stand up as no other compressors can, on such jobs as agitating, aerating, air lifting, filter service, removing press cake from filters, and caking tank and pipe lines.

The inherent wear and tear from the vibration and shock of reciprocating machines is eliminated in the smooth *Ro-Flo* rotary action. The fall-off in efficiency, inevitable with other units, never takes place with a *Ro-Flo* compressor.

For smoothness, for toughness, for simple installation and easy maintenance choose a *Ro-Flo* compressor.

Contact your nearby A-C office, or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

*Ro-Flo* is an Allis-Chalmers trademark.



A-5960-C

# UNSTICK stuck BINS



with new  
electro-permanent magnetic

## ERIEZ HI-VI BIN VIBRATORS

Here's the newest and most efficient answer to those hard-to-move materials in sticky bins... designed to provide superior operating efficiency... exclusive pinpointed vibration gets right to the trouble spot - starts stubborn materials moving!

NO RECTIFIER NEEDED • COMPLETELY ENCLOSED HOUSING • GREATER VIBRATION IMPACT THAN COMPARABLE SIZE UNITS • RUGGED AND DURABLE • LOW FIRST COST • LOW OPERATING AND MAINTENANCE COST

Special Mill Mutual ACCEPTED Units for  
HAZARDOUS DUSTY LOCATIONS

GET BIG CATALOG... WRITE TODAY  
Eriez Mfg. Co., 74-Y Magnet Dr., Erie, Pa.



### LITERATURE...

**Conveying Systems.....**Bulletin G-1A covers four basic types of systems: Fuller-Kinyon Pump, Airveyor, F-H Airslide Fluidizing conveyor and Fuller-Fluxo Conveyors.  
69 \*Fuller Company

**Conveyors.....**for press scrap and small parts and also Ash conveyor systems for handling ash & fly ash are covered in Bulletin P-57A which is now available.  
160c \*National Conveyors Co., Inc.

**Conveyors.....**Chipveyor systems for the collection and processing of metal chips and borings and reclamation of cutting oils outlined in Bulletin C-56.  
160b \*National Conveyors Co., Inc.

**Conveyors, Pneumatic.....**Bulletin No. P58-G contains complete information on pneumatic conveyor systems for handling dry granular materials.  
160a \*National Conveyors Co., Inc.

**Materials Handling Equipment.....**The H-25 Payloader 2,500 lb. carry capacity, 6-ft. turning radius, power-shift transmission. Data.  
32 \*The Frank G. Hough Co.

**Vertical Screw Elevator.....**Rotor Lift handles all dry, free flowing bulk materials. Capacities up to 6,000 cu. ft. per hour. Engineering Catalog.  
R261 \*Southwestern Supply

### Heating & Cooling

**Boiler.....**Monitor packaged boiler is available in sizes 15-60 hp, 150 psi, oil, gas & combination oil/gas fired. The complete Monitor story is available.  
230 \*Cleaver Brooks Co.

**Exchangers, Scraped Surface.....**for special heat transfer & crystallization problems are fully covered in literature which is available on request.  
197 \*Henry Vogt Machine Co.

**Heat Exchanger Tube.....**for applications from Marine to Petrochemical, from Compressor Intercoolers to "Cat-Cracker" Exchangers, in popular alloys.  
163 \*Scovill Mfg. Co.

**Heat Exchanger Tube.....**A wide selection of tubing types each designed to help you increase heat transfer efficiency.  
389-390 \*Wolverine Tube Div., Calumet & Hecla

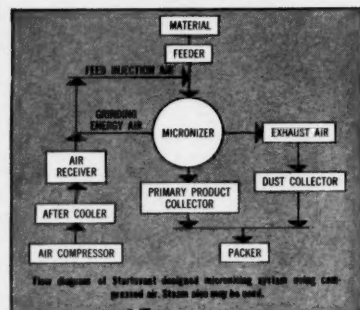
**Heat Exchangers.....**Pyrex modular shell and tube heat exchangers heat, cool and condense corrosive fluids. Units are light in weight. Mounting brackets supplied. Facts.  
245d \*Corning Glass Works

**Heat Exchangers.....**Brazed Aluminum Exchanger can handle as many as five fluids simultaneously. Units are available for either cross-flow or counter flow operation.  
30-31 \*The Trane Co.

**Heat Transfer.....**Multi-Zone Plate-coil provides for higher pressure containment & a margin of heat transfer capacity. Bul. P61 for complete data.  
399 \*Tranter Manufacturing Inc.

## Need 1/2 to 44 Microns?

**Sturtevant Micronizers\*  
Make 325 Mesh Obsolete**



Production Model  
(15 in. chamber)

### One Operation Reduces, Classifies

Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from 1/2 to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

#### No Attritional Heat

Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

#### Classifying is Simultaneous

Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

#### Eight Models Available

Grinding chambers range from 2 in. diameter laboratory size (1/2 to 1 lb. per hr. capacity) to large 36 in. diameter production size (500 to 4000 lbs. per hr. capacity). For full description, request Bulletin No. 091.

### Engineered for Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to under 1 micron at feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200-1400 lbs. per hr. A pharmaceutical house uses an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns.

Sturtevant will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. Write today.

### Can Test or Contract Micronizing Help You?

Test micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Write for full details. STURTEVANT MILL CO., 100 Clayton St., Boston, Mass.



\*REGISTERED TRADEMARK OF STURTEVANT MILL CO.  
See Us At Chemical Show—Booth 421

\* From advertisement, this issue

# E

# Engineers

CHEMICAL  
ELECTRICAL  
GENERAL  
MECHANICAL  
ELECTRONIC

Specializing in undersea weapons, also working with special weapons and missiles, we supply the Fleet with the best....from a wooded 13,500-acre site on the unspoiled Virginia Peninsula where you'll have a choice of city, suburban, or rural waterfront living in the world's most extravagantly restored history-land.

You'll like working with your government too—the feel of a job that boosts your country's security. Right now we have openings for the right men, starting at \$6285 to \$8810. Get applications (Standard Form 57) from your postmaster. Mail an application or copy of your resume to the Employment Officer today.

- paid tuition
- paid sick leave
- liberal vacations
- merit promotions
- disability benefits
- suggestion awards
- low-cost insurance
- flexible retirement plan
- world-wide transfer rights
- travel and moving expenses



U.S. NAVAL WEAPONS STATION  
YORKTOWN, VIRGINIA

## LITERATURE . . .

**Heating Equipment**.....Complete story on Grid Unit Heaters, Blast Heaters & Radiators in Catalog 956. Designed for operation on steam pressure up to 250 psi 450 temp. 266 \*D. J. Murray Mfg. Co.

**Heating Mantle**.....Series U available for flask sizes ranging from 1 liter through 22 liters. Made with quartz fabrics, designed to operate at temp. to 650C. Bul. 134 \*Glas-Col Apparatus Co., Inc.

**Kilns, Rotary**.....The outstanding roller support insures easy alignment, continuous operation & low maintenance of kilns. Details in Bulletin No. 1115. 65 \*Traylor Engineering & Mfg. Div.

**Plate Heat Exchangers**.....offer the same unique combination of structural compactness, transfer efficiency and easy operation. Help to evaluate process is available. 10-11a \*The De Laval Separator Co.

**Refrigeration**.....Bulletin 631 covers in detail the applications and other important information about the Uni-Chiller. Available now on request. 274 \*The Vilter Mfg. Co.

**Steam Trap**.....The 44-page Steam Trap book goes into detail on all the features. It also discusses trap selection, installation and maintenance. 385 \*Armstrong Machine Works

**Steam Traps**.....The 3-part TD-50 Steam Trap has only one moving part—the hardened, polished stainless steel disc. Literature Kit 2A & bulletins available. 60 \*Sarco Company, Inc.

**Unit Heaters**.....provide leak-tight operation for steam pressures up to 250 pounds and 406°F. Special coils for higher pressures and temps. Bulletin 3137-E. 57 \*Buffalo Forge Company

**Vaporizers and Liquid Phase Heaters**.....Bulletin A-100 describes the complete line available and shows typical installations. Installation requires minimum floor space. 402 \*Eclipse Fuel Engineering Co.

## Instruments & Controls

**Actuators**.....that handle difficult jobs that once required giant-size equipment. Five basic actuator sizes to cover all body styles & sizes. Booklet E-470. 48-49 \*Fisher Governor Company

**Algebraic Compiler & Translator**.....is capable of compiling a fixed and/or floating point program for the LCP-30. ACT 1 compiling routine is offered. 76 \*Royal Precision Corporation

**Analyzer**.....The two meters on the Heat Prover Analyzer show per cent by volume of oxygen & combustibles on either a 20% range span or a more sensitive 4% range. 401 \*Bailey Meter Company

**Control**.....Handbook, "Modern ph and Chlorine Control" is offered. Gives theory and application of ph control. Illustrates & describes full line. R263a \*W. A. Taylor & Co.

\*From advertisement, this issue

Let  
**Rotor Lift**  
Help You  
GEAR UP  
In... 60  
For BETTER  
PRODUCTION

Chemical processors must increase production efficiency to capitalize on the rapid expansion in the U.S. economy expected during the early 1960s. ROTOR LIFT elevating and conveying is the answer.

ROTOR LIFT, original and finest vertical screw elevator, handles all dry, free flowing bulk materials—

MORE SAFELY  
MORE DEPENDABLY  
MORE ECONOMICALLY

... Capacities  
up to 6,000 CU. FT.  
PER HR.

8  
BASIS  
TYPES  
4 DIAMETERS

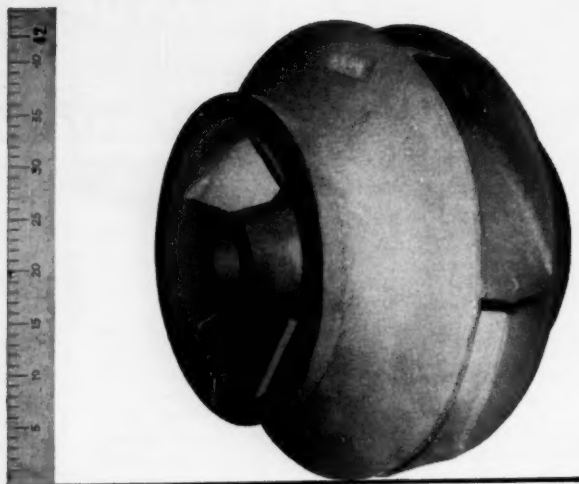
World's Largest  
Manufacturer of  
Vertical Helicoid  
Screw Elevators

Write for  
ENGINEERING  
CATALOG

**SOUTHWESTERN**  
SUPPLY and MACHINE WORKS  
OKLAHOMA CITY, OKLAHOMA

an unbeatable combination . . .

## SERVICE FOUNDRY



CF4(304L) Stainless Steel Pump Impeller, 42 inches in diameter and weighing 2300 pounds.

## AND STAINLESS STEEL

Throughout a wide range of foundry products, Service Foundry has earned its fame in stainless steel castings. One such product, a pump impeller, is shown above. But Service makes many large stainless steel castings for the chemical industry . . . in fact, *Service Foundry is the largest producer of CF4 castings in the United States.* This should mean something to you . . . as does the fact that Service Foundry regularly pours castings up to 10,000 pounds. *Capacity . . . to handle the big jobs—experience . . . to handle them well.* Yes, when your next order bears the Service Foundry name—you can be sure you're getting the very best in cast steel products.

Write for our complete brochure, *Foundry Work*  
—Steels, Alloys & Non-Ferrous



**Service Foundry**

a division of

**AVONDALE**

MARINE WAYS, INC.

VERSATILE BUILDER ON THE MISSISSIPPI

416 ERATO ST. • JACKSON 2-3836 • NEW ORLEANS 13, U.S.A.

### LITERATURE . . .

**Controller & Valve Positioner.** . . . One compact unit for temperature or pressure control & quick, accurate valve positioning. Further details in Bulletin FO29.  
146 \*United States Gauge

**Controls.** . . . . . Printweigh "400" for complete printed weight records. It prints full figures, even when unit weights are used. Complete details in Bulletin 2017.  
R275 \*Toledo Scale Corp.

**Data Processing Equipment.** . . . . The new IBM 1620 solid state engineering computer is now available. Easy to learn, operate and easy to communicate with. Details.  
6-7 \*International Business Machines

**Gage.** . . . . . New direct reading ultrasonic thickness gage measures wall thickness accurately. Full line of ultrasonic inspection instruments available. Descriptive literature.  
236 \*Sperry Products, Inc.

**Gas Meters.** . . . . New line of 600 psig rotary positive displacement type. Available in 4 sizes covering a range of from 84,000 to 1,600,000 scfh. Data Sheets.  
143 \*Roots-Connersville Blower

**Gauge.** . . . . . Liquidometer indicates the exact level at all times. Tank Gauge measures virtually any liquid. Simple to install, requires no maintenance. Details.  
231 \*The Liquidometer Corp.

**Gauge, High Pressure.** . . . . has pointer connected directly to pressure element. Available in pressure ranges from 0-1000 to 0-10,000 psi. Complete information.  
344 \*Rochester Mfg. Co., Inc.

**Gauges.** . . . . High pressure gauges used in Refineries & Chemical Plants throughout the world. Complete catalogue on large chamber reflex gauges & heated or cooled gauges.  
349 \*Strahman Valves, Inc.

**Gauges & Valves.** . . . . A complete line of specialized gages, valves & other equipment to meet your problems of observation of liquids & levels. Data on all products.  
360 \*Jerguson Gage & Valve Co.

**Instruments.** . . . . Advanced-design recorders, controllers, & Indicators with field-proved features for every processing need. Condensed Catalog F-5633-3.  
38-39 \*Barber-Colman Co.

**Leverage System.** . . . . Literature on "Flexure Plate" Leverage System, its application to filling, batching and checkweighing operations available.  
R277 \*Thayer Scale Corp.

**Liquid Level Control.** . . . . will handle almost any liquid, at any temperature, at any pressure. Available for controlling level changes from 1/4" to 150 ft. Details.  
320 \*Matnetrol, Inc.

**Miniature Instruments.** . . . . for graphic panels, consoles, or other set-ups for all your process requirements . . . including electronic, pneumatic, telemetering & measurements.  
22-23 \*The Bristol Company

**Pneumatic Controller.** . . . . Designed as a controller, transmitter, or receiver-controller for process applications. Complete specifications in WC-757.

232 \*Robertshaw-Fulton Controls Co.

\*From advertisement, this issue



# Eastern MIXERS

Mix fluids  
quickly...  
thoroughly



To meet a wide variety of process requirements, Eastern offers a complete line from lightweight portables to heavy duty, fixed mounted, propeller and turbine mixers. Each type is available with choice of standard speeds, motor enclosures, mountings, and materials of construction.

PORTABLE MIXERS with ratings 1/20 to 3 H. P. are described in Bulletin 530.



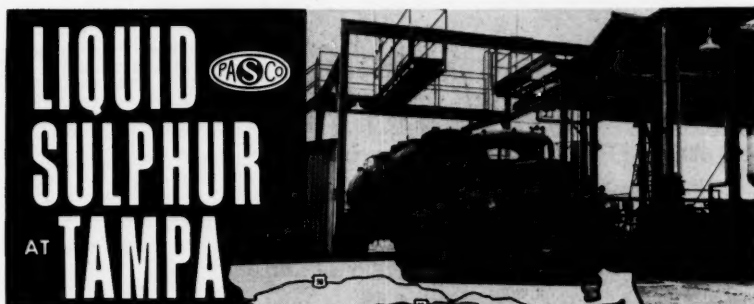
**SIDE ENTERING MIXERS**  
Handle the extra heavy-duty jobs in big tanks. Sizes 1/4 to 30 H. P. Send for Bulletin 620.

**TOP ENTERING MIXERS**  
Designed for heavy-duty applications requiring agitators from 1/4 to 10 H.P. Send for Bulletin 620.

**TURBINE MIXERS**  
Range of 1/4 to 40 H. P. solves many special mixing problems. Send for Bulletin 1210.

## EASTERN INDUSTRIES, INC.

Mixer Division, Dept. M, Norwalk, Connecticut



**NOW** in operation — PASCO's molten sulphur facility at our Black Point Terminal, Tampa. Loading tank trucks or tank cars with extremely low-ash, moisture-free liquid sulphur for customers in a 200-mile radius, or farther. Nearing completion, new dry-bulk loading facilities, with 50,000 tons stockpiled.

For information call or write:

## Pan American SULPHUR COMPANY

609 BANK OF THE SOUTHWEST BUILDING • HOUSTON, TEXAS

## Easy-To-Use!

### TAYLOR Midget Iron Tester

**Gives Fast, Accurate Tests of Iron in Water or Brine**



Here's a compact, lightweight tester that lets you make on-the-spot tests for iron content in water or brine in a matter of minutes. Gives completely accurate data to help control corrosion in piping, valves or condenser systems . . . helps you prevent scale formations in steam boilers or iron oxide deposits on heat exchanger surfaces. Sealed-in-plastic color standards cover the 0-10 ppm range which can be extended by diluting the sample. Tests are made simply by placing treated sample in test tube and comparing color with standards.

### For Complete WATER ANALYSIS

#### Taylor Water Analyzer



Use this handy, compact set to make fast, accurate tests for color, ammonia, nitrite, nitrate, chlorine, total iron, manganese, silica, copper, fluoride, bromine, aluminum, nickel and low chromate simply by using separate color standard slides with basic set.

**ALSO AVAILABLE—  
TAYLOR COMPARATORS FOR TESTING  
FOR pH, PHOSPHATE, ETC.**

### COLOR STANDARDS GUARANTEED

All Taylor liquid color standards carry an unlimited guarantee against fading. Be sure to use only Taylor reagents and accessories with Taylor comparators to assure accurate results.



**SEE YOUR DEALER** for Taylor sets or immediate replacement of supplies. Write direct for FREE HANDBOOK, "Modern pH and Chlorine Control". Gives theory and describes complete Taylor line.

**W. A. TAYLOR AND CO.**  
414 STEVENSON LANE • BALTIMORE 4, MD

# These NEW Hoke Valves are leak-tight\* FOR LIFE!



**GUARANTEED**  
against stem leakage  
from non-critical  
vacuum to  
10,000 psi.

## 100 SERIES General Purpose Valve for service to 10,000 psi

The O-ring stem seal design on this new, low-priced valve makes it permanently LEAK-TIGHT\*. Use the 100 Series where you need an inexpensive, heavy duty valve for either pneumatic or hydraulic service. It's ideal for throttling, regulating, or shut-off applications over a temperature range of -40° to 200° F. Male or female connection and panel mounting, if needed.

- GUARANTEED leak-proof O-ring seal
- Exclusive nylon stem wiper
- Centerless ground stem
- Safe, integral bonnet
- Diecast aluminum handwheel
- Rugged, forged carbon steel body in globe or angle pattern



## 300 SERIES Forged Needle Valve with Plastic Stem Tip

The same unique stem design used on the 100 Series, plus a new plastic stem tip, makes Hoke's 300 Series valve LEAK-TIGHT\* for life at both stem and seat. Made of long wearing nylon or corrosion-resistant Kel-F, these plastic stem tips have taken twice the normal closing force through 700 cycles of operation at 3500 psi — with no sign of leakage across the seat! Available in brass or stainless steel bodies, for service to 3000 psi. Panel mounting, too.

- Minimizes seat and stem point damage due to grit and over-torquing
- Provides vapor or vacuum leak-tight closure
- Minimizes opening pressure surges
- Service up to 3000 psi
- In 1/8" and 1/4" pipe sizes and 1/4" tube size



These are just two products in Hoke's extensive line of small, quality valves. If you would like our new Catalog GC959, or sample valves, write to us on your company letterhead.



**HOKE INCORPORATED**  
"Fluid Control Specialists"  
39 PIERMONT RD., CRESSKILL, NEW JERSEY

## LITERATURE . . .

**Thermometer**.....in all scale ranges from 150 F to 1000 F; dial sizes from 1" to 5"; stem lengths from 2 1/2" to 72". Complete adaptability to any installation. Catalog. 345 \*Rochester Mfg. Co.

**Transmitter, Indicating Pressure**.....Wide selection of interchangeable pressure measuring elements gives the M/44 range limits of 0-33" water to 0-6000 psi. Details. 165 \*The Foxboro Co.

## Pipe, Fitting, Valves

**Acid Hose**.....Acid discharge hose remains flexible even when cold, & is highly resistant to weathering. Has cover of tough abrasion & acid resistant rubber. 153 \*Acme Hamilton Mfg. Corp.

**Drainline, Glass**.....Bulletin PE-30 contains complete information on Pyrex brand pipe for use in drain-line systems. Glass handles wastes, particularly corrosive ones. 245b \*Corning Glass Works

**Duplex Tubes**.....New 20 page book "Solving Corrosion Problems In Industry" is now available. Fact filled book illustrates ways to solve corrosion problems. 157 \*Bridgeport Brass Co.

**Expansion Joints**.....are hydraulically formed. Welding techniques insure welds having the same thickness, strength & physical properties. Catalog 56. 159 \*Zallea Brothers

**Hinged Closures**.....for pipe lines, piping & process equip. Available in sizes 2" through 42" for A.S.A. 150-lb, 300-lb & 600-lb service, in steel or alloys. Bul. TT956. 40-41 \*Tube Turns

**Pipe**.....Saran Lined Pipe, fittings, valves & pumps are available for systems operating from vacuum to 300 psi, from below zero to 200 F. Information on request. 365 \*The Dow Chemical Co.

**Pipe**.....Fluoroflex-TS is chemically inert, corrosion-proof & offers temperature range from 100 F. to +500 F. More information in Bulletin TS-1A. 357 \*Resistoflex Corp.

**Pipe, Glass**.....Facts about Pyrex brand glass pipe or columns contained in Bul. PE-3. Complete manual on design, engineering & installation. 245a \*Corning Glass Works

**Pipe, PVC**.....Koroseal has high impact resistance, it threads easily and can be cut, welded or drilled. Booklets on Koroseal Pipe & Koroseal Sheet are offered. 1 \*B. F. Goodrich Ind. Prod. Co.

**Piping, Valves & Fittings**.....Catalog 356 & supplement 356-S contains complete details on jacketed piping, valves & fittings. Ideal for viscous fluid handling. L279 \*Parks-Cramer Co.

**TeeLet**.....available in sizes from 1/4 to 1 1/2" IPS. TeeLets are fully machined from forging quality solid steel bars & adapt to run-pipe sizes to 36". Details. 272 \*H. K. Porter Co., Inc.

\* From advertisement, this issue

## Spray Nozzle types

choice of  
over 12,000  
basic designs

## materials

brass, stainless steel,  
lead, hard rubber, hardened  
steel, tungsten carbide  
and many others.

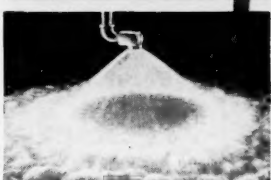
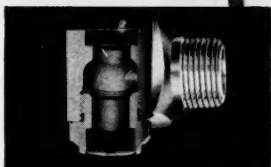
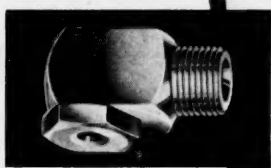
## performance

uniform distribution with  
spray angle, capacity,  
impact and atomization to  
your specifications.

## to improve every spraying operation

Improve performance, lower spraying  
costs with Spraying Systems spray  
nozzles. Prompt delivery. For complete  
information write for Catalog 24.

**SPRAYING SYSTEMS CO.**  
3275 RANDOLPH ST. • BELLWOOD, ILL.  
ADVANCED SPRAY NOZZLE DESIGN FOR NEW  
DIMENSIONS IN CONTROL AND PERFORMANCE



# ROLOCK

**SPECIALIZED WELDED FABRICATIONS**

## for example VACUUM RETORTS

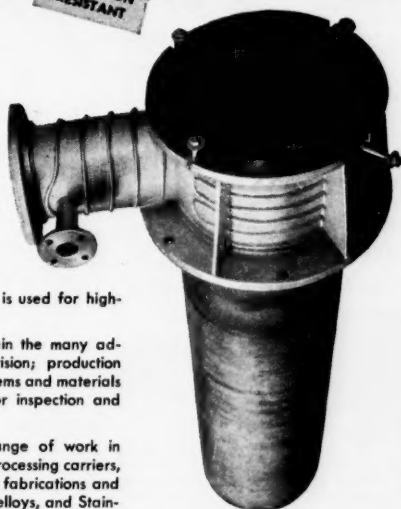
This heavy INCONEL Vacuum Retort  
is one of a number of such designs  
being produced by ROLOCK. Approx-  
imately 2 feet in diameter by 8 feet high, it is used for high-  
temperature vacuum annealing.

By entrusting such work to ROLOCK, you gain the many ad-  
vantages of competent engineering supervision; production  
personnel thoroughly experienced in the problems and materials  
involved; a modern plant fully equipped for inspection and  
testing as well as fabrication.

RoLock facilities and skills cover a wide range of work in  
pressure and vacuum equipment, specialized processing carriers,  
furnace retorts, covers and bells, trays, tanks, fabrications and  
assemblies in Inconel, Incoloy, Monel, the Hastelloys, and Stain-  
less Steels. Send us an outline of your requirements.

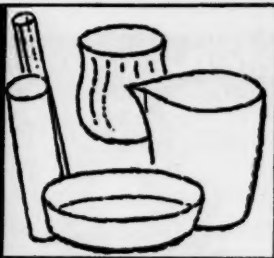
Put your problems up to:

**ROLOCK INC., 1356 KINGS HIGHWAY, FAIRFIELD, CONN.**



7RL508

# VITREOSIL® FUSED QUARTZ



**OFFERS THE FINEST  
PROPERTY VALUES  
FOR FINER PRODUCTS**

- Absolute Chemical Purity
- Extreme Heat Resistance
- Thermal Shock Resistance
- Chemical Inertness
- Outstanding Electrical Properties
- Full Range Radiant Energy Transmission

In laboratories and other applications where critical requirements must be met, there is no room for second best. Vitreosil possesses properties of greatest value for: ultra-violet applications, metallurgical investigations, chemical research, photochemistry, spectroscopy, and many uses in physical, optical and electrical research as well as product operations.

Vitreosil is available in an unusually wide variety of types and sizes—Or, we'll be happy to fabricate to your specifications. Write us about your requirements today. For your convenience, use the coupon below. See our ad in Chemical Engineering Catalog.

**THERMAL AMERICAN  
FUSED QUARTZ CO., INC.**  
18-20 Salem Street,  
Dover, New Jersey

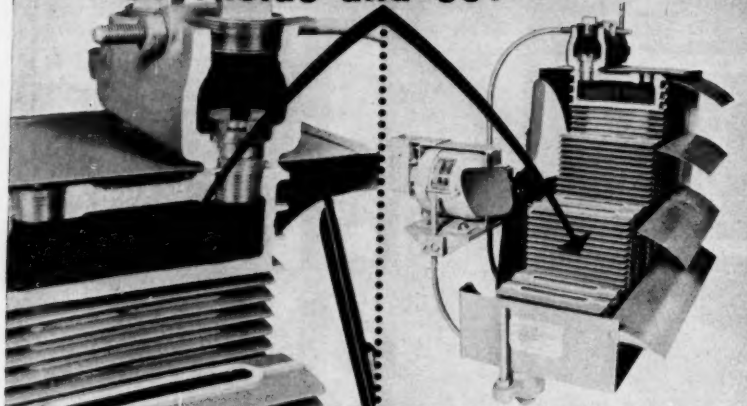
Please send technical data on

Company  
Name  
Street  
City

Zone State

it's the material that makes the difference

**inside and out**



**CORROSION - Inside and Out - causes heating equipment failures!**

**BUT NOT WHEN YOU USE**

**GRID**

*cast iron construction*

- ▶ UNIT HEATERS
- ▶ BLAST HEATERS
- ▶ RADIATORS

CORROSION internally, caused by electrolytic action as in copper tubes, can't happen in GRID's cast iron steam chambers and headers. Nor can acid condensate corrode the bottom connections. Cast iron, internally, resists corrosion.

CORROSION externally, caused by acid fumes cannot destroy GRID's cast iron finned heating surface. Widely spaced fins cast integral with the steam chamber will not corrode externally.

Send for Catalog 956 . . . The complete story on Grid Unit Heaters, Blast Heaters and Radiators

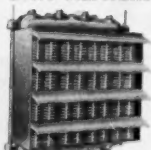
Designed for operation on steam pressure up to 250 PSI 450° temperature

INSTALL  
**GRID**  
CAST IRON

UNIT HEATERS

BLAST HEATERS

RADIATORS



Available in Horizontal and Down Blow models. All cast iron built for steam pressures up to 250 PSI 450 Degrees.

Wide range of sizes furnished with or without pressure blowers. Compact cast iron design requires less space.

Various combinations with or without Grill covers. For use in confined areas where motorized units are not desirable. For low or high pressures to 250 PSI.

**D. J. MURRAY MANUFACTURING CO.**

Manufacturers Since 1883

OFFICES IN PRINCIPAL CITIES

WAUSAU, WISCONSIN

## LITERATURE . . .

**Tubes . . . . .** A complete range of stainless grades to meet any set of service conditions . . . fully annealed tubes for maximum resistance to corrosion. Bulletin TB-329. 170 \*The Babcock & Wilcox Co.

**Tubing, Stainless . . . . .** ranges from 3/16" OD to 3 1/2" OD with wall thickness from .013" to .375". New 32-page book of technical data, sizes, grades & applications. 125 \*Allegheny Ludlum Steel Corp.

**Tubing, Welded . . . . .** Properties include uniformity of structure, wall thickness, concentricity & dimensional accuracy. "Welded Steel Tubing" Bulletin 8591 offered. 379 \*Formed Steel Tube Institute

**Valve . . . . .** Full opening Union Check types allows free passage of product separating or line cleaning devices. Fits 2" diameter pipe. Rated 500 P.S.I.-W.O.G. 132 \*Clayton Mark & Co.

**Valve, Ball . . . . .** The Econ-O-Miser is available in many combinations of seats, O-Rings & body materials. Complete technical information in "Comparison" bulletin EB 101. 310-311 \*Worcester Valve Co., Inc.

**Valve, Check . . . . .** Technocheck offers tight sealing, low pressure drop and long life with low upkeep. Can be used for water, air, oil or gas service. TL267 \*Techno Corporation

**Valve, Forged Needle . . . . .** The 300 Series with plastic stem tip are available in brass or stainless steel bodies for service to 3000 psi. Catalog. 264b \*Hoke Inc.

**Valve, Gate . . . . .** Catalog 1200 contains complete information about Pressure Sealing Gate Valves. Designed for pressures up to 720 psi (cwp) & temperatures up to 250 F. 74-75 \*W-K-M Div. of ACF Industries

**Valve, General Purpose . . . . .** for service to 10,000 psi. Ideal for throttling, regulating, or shut-off applications over a temp. range of 40 to 200 F. Catalog. 264a \*Hoke Inc.

**Valve, Plug . . . . .** The new type G Durco Sleeve Valve offers 150 psi rating. Ductile or stainless screwed or flanged 1/2" to 2" sizes. Ductile flanged sizes to 6". Bul. V/12. 211 \*The Duriron Co.

**Valves . . . . .** Non-lubricated steel plug valves can be supplied: wrench-operated; worm gear-operated. Motor operated for remote control. Catalog. 148 \*Wedgeplug Valve Co. Div.

**Valves . . . . .** available in the largest selection of metals and alloys to handle practically every corrosive fluid. Write for further details on these valves. 24-25 \*The Wm. Powell Company

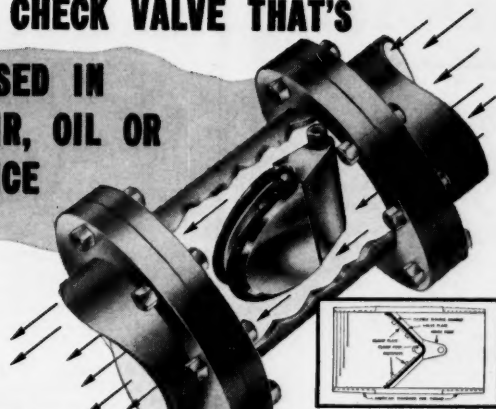
**Valves, All-Glass Y . . . . .** The new Bulletin PE-4 offers complete information on the all-glass Y-valve. Now available in 1 1/2" and 2 1/2" sizes. 245c \*Corning Glass Works

**Valves, Ball . . . . .** Literature on "Double-Seal" ball valves is offered. Available from high vacuum to 300 psi. Operated hydraulically, pneumatically or electrically. 229 \*Jamesbury Corp.

\* From advertisement, this issue



## A UNIQUE CHECK VALVE THAT'S UNSURPASSED IN WATER, AIR, OIL OR GAS SERVICE



**Technocheck**

**OUTPERFORMS • OUTWEARS OTHER VALVES • COSTS LESS TO MAINTAIN**

In field service in a wide range of water, gas, air and oil applications, Technocheck's performance and reliability are unsurpassed. Its exclusive design eliminates valve seats. Tight sealing, low pressure drop and long life with low upkeep are some of its important characteristics.

SCHEDULE OF STANDARD VALVE SIZES			
GENERAL DESCRIPTION	PSI	SIZES	
Cast, Iron Flanged	125	4", 6", 8"	
Steel, Male Threaded Ends	150	1 1/2", 2", 2 1/2", 3"	
Steel, Flanged	150	3", 4", 6", 8"	
PVC, Male Threaded Ends	125	1 1/2", 2", 3"	
PVC, Flanged	125	2", 3"	
PVC, Flanged	50	4", 6", 8"	

*We invite inquiries on other sizes and in special materials.*

**Techno Corporation**

Dept. CE

16 West 5th Street, Erie, Pa.

## Protects Metals Against Hot Acids, Acid and Sulfurous Fumes, Salt Spray, Steam, Mild Alkalies, Up to 600° F.



Markal "D-A" Coatings will protect metal against any corrosive action. It is an ideal product for ore sintering plants, plating plants, food plants, lumber kilns, foundries, chemical plants, sewage disposal plants, laundries, heat exchangers . . . many others.

Markal "D-A" Coatings are applied by brush or spray and can be air dried or baked. The Coatings will withstand temperatures up to 600°F.

For free sample write on company letterhead, stating temperature extremes, surface temperature at time of application, and corrosive condition.

Other Markal Coatings are available in a complete range of types for any condition and temperatures up to 2200°F. Send for catalog No. MPC.

The Markal Company, 3106 West Carroll Avenue, Chicago 12, Ill.  
Telephone Sacramento 2-6085



### INDUSTRIAL THERMAL INSULATION

**Just Published**—How to select, specify, and apply the most efficient and economical insulation for any industrial need. Gives tested methods and data for using modern materials for both high and low temperatures. Also explains the theory and mathematics of heat transfer. Includes information on cellular glass products, foamed plastics, and other advances. By A. C. Wilson, Owens-Corning Fiberglas Corp. 295 pp., 114 illus., \$9.00

### ELECTRICAL ENGINEERING for PROFESSIONAL ENGINEERS' EXAMINATIONS

**Just Published**—This book prepares you thoroughly for the electrical engineering examination for Professional Engineer in the various states. Provides a quick run-through of theory and methods of application, and gives scores of questions typical of those asked on examinations. With each question is the type of answer expected by today's boards of examiners. By John D. Constance, Engineering Registration Consultant. 456 pp., 5% x 8, 381 illus., \$9.50

### THERMODYNAMIC and TRANSPORT PROPERTIES of GASES, LIQUIDS and SOLIDS

Presents essential facts, data, and information for designers, including thermodynamic and transport properties, PVT data and equation of state, experimental transport properties, and high-temperature thermodynamic properties of gases. Sponsored by Standing Committee on Thermophysical Properties, Heat Transfer Div., ASME. 472 pp., 8 1/2 x 11, 274 illus., \$12.50



6 books in one!

### Just Published ENGINEERING MANUAL

For quick answers to engineering problems, including fields outside your own—a practical reference of data and methods in architectural, chemical, civil, electrical, mechanical, and nuclear engineering. Covers most-needed essentials—everything from basic principles to applications. Prepared by a staff of specialists. Editor, R. H. Perry, U. of Oklahoma. 680 pp., 450 illus. and tables, \$9.50

FREE EXAMINATION

### See These Books On 10-Day Trial

McGraw-Hill Book Co., Dept. CE-11-16  
327 W. 41st St., New York 36, N. Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

- ☐ Wilson—Indus. Therm. Insulation, \$9.00
- ☐ Constance—Elec. Engrg. for P.E. Exam., \$9.50
- ☐ Perry—Engineering Manual, \$9.50
- ☐ ASME—Thermo. & Trans. Prop. of Gases, Liquids, and Solids, \$12.50

(PRINT)

Name .....

Address .....

City ..... Zone ..... State .....

Company .....

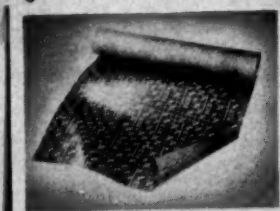
Position .....

For price and terms outside U.S. write McGraw-Hill Int'l., N.Y.C.

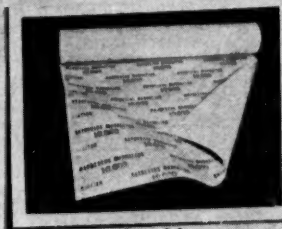
CE-11-16

# MEMO

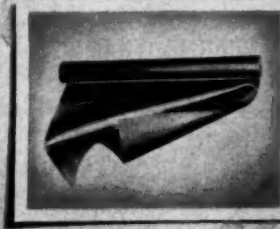
Ben:  
I'm answer to your memo,  
R/M makes all kinds of gasket  
materials - but here are some  
of the most useful. Tom



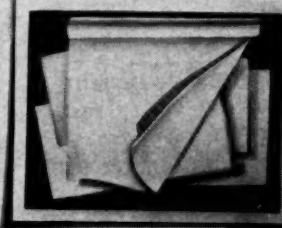
K-68



10,000



NEOPRENE



"TEFLON" SHEETS  
AND CLOTH

A big advantage to you is the years of experience behind R/M gasket materials. R/M's engineers, who have custom designed packings and gaskets for every industry, are familiar with the problems you face and their solutions. You will find those solutions—in many cases—in R/M gasket materials described here. Where these materials do not exactly meet your requirements, feel free to call on R/M engineers for help.

**K68**—Recommended for use with hot oils, solvents of the gasoline and toluol types. A highly flexible, smooth-surfaced fiberized asbestos-Neoprene combination containing no sulfur.

**10,000**—Excellent for use where temperatures or pressures are extremely high or where flanges must be narrow. The strongest compressed asbestos sheet packing on the market. Made of Canadian long crude asbestos fibers and the best grade natural rubber. Has outstanding aging characteristics and a tensile strength of 10,000 psi.

**Neoprene**—Formed into gasket sheets by R/M in a wide range of hardnesses and densities. Resists most oils (except chlorinated, aromatic and ketone) and temperatures up to 250°F or higher.

**"Teflon" Sheets**—Show no reaction to chemicals within the temperature range of -80° to 500°F, unaffected by any known industrial acids and caustics. Has no known solvent; nonadhesive, noncontaminating.

**"Teflon" Cloth**—Asbestos cloth impregnated with "Teflon" or glass cloth coated with "Teflon," for a combination of the desirable characteristics of each.

\*A Du Pont trademark

R/M MAKES A COMPLETE LINE OF MECHANICAL PACKINGS—Vee-Flex,\* Vee-Square,\* Universal Plastic, and "versi-pak"®; GASKET MATERIALS; "TEFLON" PRODUCTS, including flexible wire-braided and rubber covered hose. SEE YOUR R/M DISTRIBUTOR.

**R  
M**

## PACKINGS

RAYBESTOS-MANHATTAN, INC.

PACKING DIVISION, PASSAIC, N.J.

MECHANICAL PACKINGS AND GASKET MATERIALS

RAYBESTOS-MANHATTAN, INC., Mechanical Packings • Asbestos Textiles • Industrial Rubber • Engineered Plastics  
Sintered Metal Products • Abrasive and Diamond Wheels • Rubber Covered Equipment • Brake Linings  
Brake Blocks • Clutch Facings • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

## LITERATURE . . .

**Valves, Ball**.....with drip tight shut-off, self adjusting seats for extended valve life, quick opening, two-way flow, etc. Booklet 1100 describes complete line.  
307 \*Hills-McCanna Co.

**Valves, Control**.....are available for a wide range of temperatures. The Series 800, Type 12 single seated is designed for liquid oxygen service. Catalog C800-1.  
395 \*Minneapolis-Honeywell

**Valves, Diaphragm**.....give dependable performance for vacuums down to 0.1 micron . . . with leak rates of less than 0.1 micron cubic ft./hr. Further facts available.  
171 \*Grinnell Co., Inc.

**Valves, Gate**.....are available in the metals or special alloys needed for your special requirements. All the facts on plus-values in the new Catalog No. 57.  
367 \*Darling Valve & Mfg. Co.

**Valves, Knife Gate**.....in a wide range of metal combinations & in several different styles. Rugged construction withstands piping strains & line pressure. Bul. 300.  
66 \*DeZurik Corp.

**Valves, Solder End**.....Folder 198-A about Solder End Valves contains information on globe, gate, and check valves. These valves give both economy and quality.  
62 \*Jenkins Valves

**Valves, Solenoid**.....An authoritative booklet, fully illustrated, with flow charts & diagrams, covering every important design. Complete guide for calculating flow, etc.  
201 \*Valcor Engineering Corp.

**Valves, Split Body**.....with interchangeable pneumatic electric, electro-hydraulic & manual actuators. Sizes ½"-8". Details in a new brochure.  
68 \*General Controls

## Process Equipment

**Airlock Feeders**.....Bulletin P58, "How to Select A Rotary Airlock Feeder" is available on request. Rotary Airlock Feeders for dust control & pneumatic conveying.  
350 \*Prater Pulverizer Co.

**Automatic De-Sludger**.....New Westfalla SAMN-15007 for continuous high capacity clarification. Up to 8000 gph. capacity. Bulletin on "Big Sam".  
355 \*Centrico Inc.

**Centrifugal Spray Machine**.....is a compact self-contained unit constructed for continuous high-temperature operation. More information in Bulletin No. 51.  
293 \*Bowen Engineering Inc.

**Centrifugals**.....for liquid-solids separation. Literature on Batch-O-Matic, Batch-Master, Suspended, Center-Slung, Maxi-Flex and Continuous is now available.  
28-29a \*American Mach. & Metals, Inc.

**Centrifugals**.....Roberts centrifugals can handle stubborn liquid-solid problems. The latest centrifugal information contained in new Bulletin No. 2827.  
382 \*The Western States Machine Co.

\*From advertisement, this issue

**Centrifuges**.....large centrifuges available—even up to 80" bowl diameter. Also offer the greatest force field for any given bowl diameter. Bulletin 356.  
82 \*Heyl & Patterson, Inc.

**Cryogenerator**.....is available in four different capacities of 3,000, 12,000, 40,000 & 160,000 BTU/hr. at minus 320 degrees Fahrenheit. Brochures & technical information.  
18-19 \*North American Philips Co.

**Cyclones**.....are built from 1½" to 36" diameter. The 1½" Cyclone processes up to 2 GPM & is capable of unusually sharp separation in 15 micron range. Bul. 1157-CY1.  
B244 \*Heyle & Patterson Inc.

**Dissolvers**.....with the exclusive new maximum power delivery transmission system. Super Series are high speed, high shear, impeller-type units. Complete information.  
381 \*Morehouse Cowles, Inc.

**Dryer**.....The new Fluid Bed Dryer Unit has many advantages such as: high thermal efficiency, small space requirements, continuous, automatic, dust-free operation, etc.  
172 \*Combustion Engineering Corp.

**Dryer**.....Dryers—large or small—are designed to fit the job and to give years of satisfactory performance at minimum cost. More information.  
61 \*General American Transportation

**Dryers**.....Lectrodryers are long on engineering . . . have the built-in extra capacity that always seems to be needed. Advice on dry controlled atmosphere & other information.  
228 \*Pittsburgh Lectrodyer Div.

**Dryers**.....Drying equipment for the food, chemical and process industries . . . Conveyor Dryers, Spray Dryers, Tray Dryers, Truck Dryers. Bulletin #448.  
371 \*Proctor & Schwartz Inc.

**Dryers**.....with proven high-level production, minimum of maintenance requirements, fast installation & low erection costs. Complete details are available.  
393 \*C. G. Sargent's Sons Corp.

**Dryers, Mechanical Drive**.....may be used for either drying or cooling & are available in direct or indirect types. Built in standard lengths of 10 or 20 ft. Details.  
144 \*The Feffrey Mfg. Co.

**Dryers & Reactors**.....Full details of horizontal and pan dryers and reactors contained in the illustrated technical bulletins that are available.  
242 \*Bethlehem Foundry & Machinery

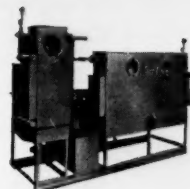
**Dryers, Rotary**.....Roto-Louvre dryers provide precise processing for heat-sensitive, friable & hygroscopic materials. Data on this & facts on dryer line in Book 2511.  
215 \*Link-Belt Co.

**Dryers, Vacuum Tumble**.....offer pre-tested, pre-packaged savings. Technical literature on these dryers and details of pre-test facilities.  
42-43 \*Patterson-Kelley Co., Inc.

**Dust Control**.....Ducolone cyclone dust collectors are available in a wide range of capacities & in multiple units & special materials to meet all needs.  
222 \*The Ducon Co.

## KATHABAR<sup>®</sup> SYSTEMS

*Give these advantages to specifying engineers:*



## STERILE AIR

*Now you can design spaces to maintain air sterility as scientifically as temperature and humidity. Only Kathabar enables you to deliver air at 5 micro-organisms per 10 cu. ft. or less, continuously.*

## FROST-FREE COOLING

*Get continuous air supply at dry bulbs and dew points way down to -90 F. No freeze-ups... no fluctuating efficiency... no defrosting shutdowns... no duplicate sets of coils. Cool better; fewer tons. Proved in capsule-filling... photo film coating and chilling... cooling ammonium nitrate... environmental testing of chemicals and packages.*

## GET FACTS



59-2C

### SURFACE COMBUSTION CORPORATION

2380 Dorr Street, Toledo 1, Ohio

Send facts on Kathabar systems for following application:

.....  
name & title .....  
company .....  
street .....  
city ..... zone ..... state .....

\* From advertisement, this issue



## *You can automate from bin to batch with Richardson equipment*


Whether your requirements are large or small, a Richardson Select-O-Weigh automatic proportioning system offers you the advantages of — 1. Savings in labor costs. 2. Increased productivity. 3. Quality control. 4. Better housekeeping. 5. Permanent printed records. Incorporated into and governed by a Select-O-Weigh System are such units as —

**Feeders** — Designed to handle your material quickly and quietly — hundreds in use on all kinds of products.

**Scales** — Richardson Automatic Scales are known for speed and dependability. Any number can be remotely controlled by a Select-O-Weigh system.

**Controls** — Program your production and processes by punched card, formula board, formula capsule or weight-selector verniers. Only Richardson offers all four. Control is from a single electronic panel board, operated by one man. No special training is required.

**Readout** — Richardson furnishes counters, totalizers, printers, typewriters and recorders of all types.

Richardson's nationwide network of service facilities is at your disposal within 24 hours if required. Likewise, Richardson helps you at start-up of your system and thoroughly checks it in operation. For full details on how you can automate your processing with Richardson equipment, write or call today. 

Richardson Scales conform to U.S. Weights and Measures H-44 for your protection.

*Here's the answer...*

# Richardson

MATERIALS HANDLING BY WEIGHT SINCE 1902



**RICHARDSON SCALE COMPANY • CLIFTON, NEW JERSEY**

Sales and Service Branches in Principal Cities • Also manufactured in Europe to U.S. Standards.

### LITERATURE . . .

**Dust Control** . . . . . The UW-4 Washers are ideal for high loading conditions where maximum efficiency is desired. Self-cleaning & fire & explosion proof. Bul. W-7456. 222 \*The Ducon Company Inc.

**Filter** . . . . . Bulletin 122 covers the horizontal filter. Designed to handle both ash & carbon in one automatic operation. Now available on request.

154 \*Industrial Filter & Pump Mfg.

**Filter** . . . . . EimcoBelt is a perfected continuous belt drum filter. When equipped with cloth or metallic medium, it eliminates blinding. Bulletin F-2053. Cover \*The Eimco Corporation

**Filter Cartridges** . . . . . New tech. bulletin contains data on use of replaceable filter cartridges in the microclarification of liquid-chemicals, petro-chemicals, etc. 128 \*Commercial Filters Corp.

**Filter Media** . . . . . Feon is available by the roller tailored to fit all types of fluid/solid separation process equipment. Literature is available on request.

28-29d \*American Machine & Metals,

**Filter Paper** . . . . . Grades available to meet practically any process requirements. Sample folder of the most popular filter papers is available on request. 374 \*The Eaton-Dikeman Co.

**Filter Press** . . . . . can handle most filterable mixtures & most filter media. Catalog includes details of Sperry's Plate-Shifters, Closing Devices & other accessories. 398 \*D. R. Sperry & Co.

**Filter Systems** . . . . . Experienced men available coast to coast to solve industrial dust problems. Filter efficiencies as high as 99.99%. Bulletin #F103. 361 \*Western Precipitation Corp.

**Filters** . . . . . Vertical leaf models in both horizontal & vertical tank designs. Batch-Miser in horizontal plate models for polish filtration & batch operations. Lit. 28-29c \*American Mach. & Metals, Inc.

**Filters** . . . . . with many design advantages & features such as finger leaf spacers, wingwheel closures, tilting leaves, oscillating sluice, etc. Bul. EF/2a. 219 \*The Duriron Company, Inc.

**Filters, Continuous** . . . . . Literature on pressure type continuous filters with vacuum or pressure rotary drum and horizontal table is now available.

28-29b \*American Mach. & Metals, Inc.

**Fume Hoods** . . . . . resulting from years of study, research and development. A copy of the new and comprehensive Fume Hood Catalog DH3 is now available on request. T244 \*Duralab Equipment Corp.

**Glass-Bag Filter** . . . . . available to solve toughest air pollution problems: cement kilns, calciners, metallurgical furnaces, power boilers, etc. 67 \*Dracco Division of Fuller Co.

**Hammer Mills** . . . . . Heavy duty hammer mill crushes, grinds, shreds to finished size in one operation. Catalog tells how you can step up your output, & improve quality. 377 \*William Pat. Crusher & Pulverizer

\*From advertisement, this issue





## STOPS LEAKS PERMANENTLY: prove it at our expense!

Use *Leak Lock* to seal thread and flange joints... to keep bolts, nuts and plugs from loosening under the most rigorous usage. It's been job-proved in thousands of applications to give these advantages...

- Withstands solvents that eat away other joint compounds.
- Remains flexible indefinitely... joints won't freeze.
- Gives a tight seal under a wide range of temperatures, pressures.
- Does not heat spontaneously.
- Is unaffected by oil, gasoline, refrigerants, most gases and chemicals.
- Makes work easier... flows on and stays where applied.



Approved by Underwriters' Laboratories for gas, oil, propane and butane equipment.

**FREE SAMPLE**—Leak Lock is available in handy tubes and in cans. Write on your letterhead for sample tube.

**HIGHSIDE CHEMICALS INCORPORATED**  
20 Colfax Avenue • Clifton, New Jersey

## J. P. DEVINE MANUFACTURING CO.

49th St. & A.V.R.R. Pgh., Pa.



Vacuum Dryers • Blenders and Mixers • Ball Mills • Autoclaves • Paint and Paste Mixers • Agitators



Impregnators • Vacuum Pumps • Jacketed Valves • Pipes and Fittings • Code Design • Fabrication



Send for free catalog with complete details.

**Continental Conveyors**

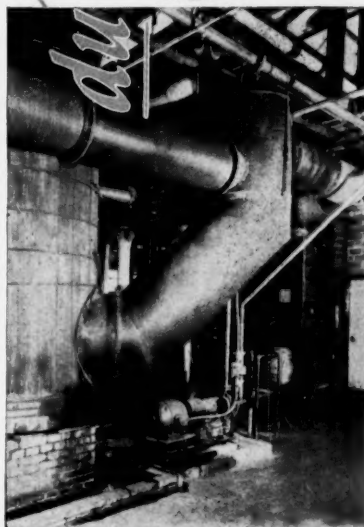
*for all materials handling needs*

- Belt Conveyors
- Bucket Elevators
- Screw Conveyors
- Feeders
- Complete Conveyor Systems

See your nearest authorized Continental Distributor

**Continental G Company**  
INDUSTRIAL DIVISION  
ATLANTA • DALLAS • HOUSTON • KENTON • MEMPHIS • MOBILE • NEW YORK

## du Verre CORROSION REPORT



### DU VERRE RESIN BONDED FIBER GLASS EQUIPMENT SOLVES A TOUGH CORROSION PROBLEM!

This 36" diameter du Verre vent assembly installed in a large Eastern chemical plant, replaced a rubber lined duct which failed after only one year's service. Prior to the rubber lined duct, a stainless steel unit failed after only a few months' service. The du Verre duct has been in continuous service for over four years, and shows no signs of corrosion. It has been handling gases containing HBr, HCl, Chlorobenzene and other organic solvents. Since du Verre resin bonded fiber glass is homogeneous in structure, external corrosion which was a problem with the other forms of construction, is entirely eliminated.

du Verre offers a wide variety of resin formulations to provide complete protection under almost any condition...

- #11 offers good acid and solvent resistance at a moderate cost.
- #22 is a fire retardant resin with superior corrosion resistance.
- #77 is a premium grade resin with excellent corrosion resistance at temperatures up to 300°F.
- #101 is a furfuryl alcohol resin which has good resistance to alkali solvents and many acids.
- In addition, special resin formulations, including epoxies, are available for special applications.

Learn how du Verre can solve your corrosion and contamination problems. Write today for your free copy of Bulletin No. 100.

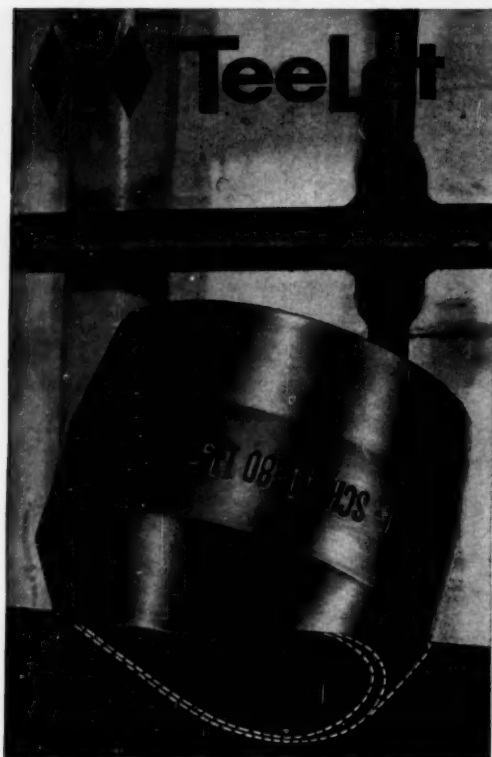


See Us  
At The  
Chemical  
Show  
Booth 891

duVerre, Incorporated

Box No. 37-A • Arcade, N.Y.

FOR 1/8 TO 1 1/2 INCH BRANCH CONNECTIONS



MARK



CUT



WELD

## NEW W-S TeeLet SLASHES TEE COSTS 50% OR MORE!

The new W-S TeeLet replaces conventional Tees of cast or malleable iron, welded or forged steel . . . requires fewer stock sizes. Available in sizes from 1/8 to 1 1/2" IPS, TeeLets are fully machined from forging quality solid steel bars and adapt to run-pipe sizes to 36". They require no additional joint strength calculations for any ASTM A-53 or A-106 Grade B run-pipe of Schedule 40 or 80.

What about cost? A size-by-size comparison with conventional Tees shows TeeLets average less than 50 per cent of the cost you now pay. A W-S TeeLet, with screwed, socket-weld or butt-weld ends, requires no shaping, fitting, beveling or extra alignment. You can connect to the run-pipe at any point. Short heights mean easy inspection of the attachment weld or back-weld, if desired.

A W-S TeeLet costs less to buy, less to install than anything you can buy or make. For complete information, prices, and names of distributors, write: *Forge and Fittings Division, H. K. Porter Company, Inc., Box 95, Roselle, N. J.*

**FORGE AND PORTER FITTINGS DIVISION**

**H.K. PORTER COMPANY, INC.**

**PORTER SERVES INDUSTRY:** with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepco" Systems—H. K. PORTER COMPANY (CANADA) LTD.

### LITERATURE . . .

**Hermetic Centrifuge.** . . . Corrosion-resistant and easy to clean, these centrifuges meet all the requirements of industrial service. Technical service & information. 10-11b \*The De Laval Separator Co.

**High Vacuum Still.** . . . operates at low heat so there's low product waste, higher yield. Four sizes from two lbs. to two tons per hour. Bul. 3-1 for details. 356 \*Consolidated Vacuum

**High Vacuum Stills.** . . . Continuous production stills run virtually unattended; fully automated, if you prefer. Bulletin 3-1 has details on test runs. 226 \*Consolidated Vacuum Corp.

**Micronizers.** . . . grind & classify in one operation in a single chamber. Can handle heat-sensitive materials. Eight models available. Bulletin No. 091. R260 \*Sturtevant Mill Co.

**Mill.** . . . The "Jet-o-mizer" grinds more products to finer particle size with greater uniformity. Available in laboratory sizes & production models to 8000#/hr. 387 \*Fluid Energy Processing

**Mills.** . . . The new "G" series Colloid Mills in industrial and sanitary models are available in 1 HP to 125 HP. Complete information is available on request. 338 \*Chemicolloid Laboratories, Inc.

**Mills.** . . . The Tornado Mill's exclusive 360 degrees screen assures an average of 300% more useable material per hour. New Size Reduction literature, Bul. 350. 384 \*F. J. Stokes Corp.

**Mist Eliminators.** . . . Latest design guides in the recommended type & method of installation best suited to your particular operating conditions are available. Bul. ME-9. 276 \*Metal Textile Corporation

**Mixers.** . . . A complete line from lightweight portable to heavy duty fixed mounted propeller & turbine mixers. Portable mixers described in Bul. 530. TL263a \*Eastern Industries, Inc.

**Mixers.** . . . A full line . . . side drive, tank top, portable or tripod, and continuous pipeline mixers. Details on mixers for all fluid mixing needs. Bul. 582. 105 \*Netco Corporation

**Mixers, Batch.** . . . Design prevents material separation or particle breakdown regardless of densities. Capacities: 5 qts. to 160 cu. ft. Hand & motor driven models. Bul. 334 \*Daffin Mfg. Co.

**Mixers, Side-Entering.** . . . Handle the extra heavy-duty jobs in big tanks. Available in sizes 1/4 to 30 H.P. Complete information in Bulletin 620. TL263b \*Eastern Industries, Inc.

**Mixers, Top-Entering.** . . . Designed for heavy-duty applications requiring agitators from 1/4 to 10 H.P. Bulletin No. 620 gives the complete story. TL263c \*Eastern Industries, Inc.

**Mixers, Turbine.** . . . Bulletin 1210 contains details on these turbine mixers which solve many special mixing problems. Available in a range of 1/4 to 40 H.P. TL263c \*Eastern Industries, Inc.

\* From advertisement, this issue

## LITERATURE . . .

**Mixing & Grinding Equipment.**... Complete information on Double Arm Kneader, High Speed Three Roller Mill, Heavy Duty Change Can Mixers, Change Tank Mixer, etc.  
330 \*Charles Ross & Son Co.

**Mulling**..... The Handbook on Mulling covers the benefits of controlled mulling, typical Mix-Muller applications, Air Conveyor Systems, etc. Includes illustrations & charts.  
342-343 \*National Engineering Co.

**Process Equipment.**.... Bulletins on Homogenizers, Triplex Hi-Pressure Pump, HX-Hydraulic Pressure Exchange Pump and RE Colloid Mill are available on request.  
199a \*Manton-Gaulin Mfg. Co.

**Process Equipment.**.... for problems you may have involving mixing, blending, crushing, grinding, dispersing, cutting or sifting of your materials. Catalog No. 80.  
324 \*Abbe Engineering Company

**Process Equipment.**.... including drum flakers and dryers, rotary and conical vacuum dryers, vacuum shelf dryers, granulators, Tornado mills, etc. Full information.  
323 \*F. J. Stokes Corp.

**Process Equipment.**.... High-impact rubber-plastic is most economical for chemical resistant equipment. For valves, linings, pumps, etc. Bulletins give further details.  
234 \*American Hard Rubber Co.

**Process Equipment.**.... Catalog contains complete details on vacuum-dryers, blenders & mixers, ball mills, autoclaves, jacketed valves, pipes & fittings, etc.  
BL271 \*J. P. Devine Mfg. Co.

**Process Equipment.**.... Fact-packed folder gives complete information on each of the many services. Contains invaluable reference material. Available now.  
162 \*Artisan Metal Products, Inc.

**Process Equipment.**.... Bulletin G-3C completely illustrates the full line of equipment available plus accessory equipment. Includes drawings and charts.  
71 \*Fuller Company

**Process Equipment.**.... Detailed information & useful design data is contained in the General Turbo-Mixer Bulletin and in the RDC Extraction Column Bulletin.  
59 \*General American Transportation

**Rotary Steam Tube Dryer.**.... Catalog A contains information on this type dryer. Equipment available for pressing drying & cooling problems.  
358 \*Davenport Machine & Foundry Co.

**Safety Heads.**.... In use in virtually every type of industry where pressure protection is a problem. Feature rupture discs for added protection. Information.  
364 \*Black, Sivalls & Bryson, Inc.

**Separator.**.... Constructed of carbon steel or stainless steel, the Synchromatics accommodate a full range of screen sizes & are available in 1, 2, or 3 decks. Details.  
10-11c \*The De Laval Separator Co.

**Separator, Induced Roll.**.... High intensity purification & concentration for higher quality products. Available with 1 to 7 rolls in 2" to 30" widths. Details.  
278 \*Dings Magnetic Separator Co.

\* From advertisement, this issue

# Welcome to the "university" of Chemical Progress



## a 5-day "curriculum" valuable to you and your job

At the 27th Exposition of Chemical Industries you can see and learn more about newest developments in your industry than is available through any other channel.

Under one roof you'll find over 500 exhibits—ways to cut costs, increase production, step up plant efficiency and improve your own products. There will be displays of plant and process equipment, instruments and controls, material handling and packaging equipment, new and improved materials, *plus* special sections for chemicals and laboratory equipment and supplies. Compare, judge new developments in your fields of interest.

Whether your responsibility is management, design, production or research you will be fortified with new ideas and better prepared to cope with tomorrow's problems. A visit to the Exposition will be one of the most profitable investments you have ever made.

Set these dates aside now—and bring your key associates.

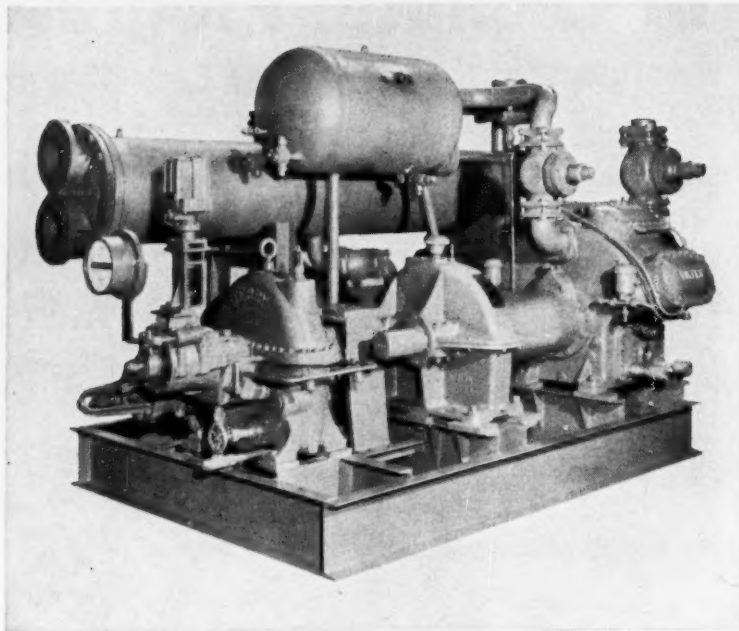
# 27th EXPOSITION OF CHEMICAL INDUSTRIES

## N. Y. COLISEUM • NOV. 30—DEC. 4.

Management: International Exposition Co., 480 Lexington Ave., New York 17, N. Y.

Ⓜ 2201

# Variable refrigeration capacity controls vital chemical reactions



This special Vilter Uni-Chiller has a capacity of 80 tons of refrigeration, operates at 30 degrees suction and 105 degrees condensing temperatures.

Variable refrigeration capacity is of extreme importance in the manufacture of the product of a large southern chemical plant. Vital chemical reactions require holding temperatures within very close tolerances.

However, because the quantity manufactured changes from time to time, great flexibility is demanded of the refrigeration equipment to constantly maintain the proper temperature. This is achieved through a Vilter variable capacity refrigeration system.

Providing this refrigeration flexibility is a special custom-designed Vilter Uni-Chiller which includes: a shell and tube condenser, an eight cylinder compressor, a variable speed turbine operating through reducing gears, explosion proof controls, and special safety components. Varying the turbine speed changes the amount of refrigeration capacity... the response is quick.

During manufacturing, the refrigeration circuits are factory assembled and tested, simplifying field installation.

If you have a refrigeration or pressure vessel application, write Vilter for a review of your problem.



## The Vilter Manufacturing Company Milwaukee 7, Wisconsin

Air Units • Ammonia and Freon Compressors • Booster Compressors  
Baudelot Coolers • Water and Brine Coolers • Blast Freezers  
Evaporative and Shell and Tube Condensers • Pipe Coils  
Valves and Fittings • Pakice and Polarflake Ice machines.



Write for Bulletin 631 to  
The Vilter Manufacturing  
Company, Dept. K-903  
2217 South First Street  
Milwaukee 7, Wisconsin

## LITERATURE . . .

**Spray Nozzles**.....Complete choice of design types, thousands of capacities to choose from, & choice of materials for chemical compatibility. Catalog 24.  
TL265 \*Spraying Systems Co.

**Spray Nozzles**.....A complete range of nozzle sizes & capacities available & made from bronze, cast iron, stainless steel, & from any special machineable material. Catalog.  
240 \*Spray Engineering Co.

**Strainers**.....in sizes from 1/4" to 8", for service 250 psi at 450 F. to 2500 psi at 1100 F. "Y" or Angle with screwed or socket-weld (flanged) connections. Bul. 11-21C.  
142 \*Strong, Carlisle & Hammond

**Turbine Agitators**.....Moduflex agitators are described in technical Bulletin M-200. Can be used in many applications formerly requiring steady bearings.  
312 \*Chemineer, Inc.

## Pumps, Fans, Compressors

**Air-Conditioning Systems**...Kathabar systems offer sterile air and frost-free cooling as special advantages to specifying engineers. Facts available.  
269 \*Surface Combustion Corp.

**Compressor, Air**.....CP type built in sizes to 5000 hp for pressures up to 15,000 psig, or for vacuum service. Motor or steam drive. Lubricated or non-lubricated cylinders.  
50-51 \*Chicago Pneumatic

**Compressor, Rotary**.....Positive Displacement Axial-Flow Rotary Compressors are available in single-stage or two-stage units. New Bulletin ACO 100.2 offered.  
400 \*Fairbanks-Morse

**Compressors**.....Ro-Flo compressors for such jobs as agitating, aerating, air lifting, filter service, removing press cake from filters, & caking tank & pipe lines.  
259 \*Allis-Chalmers

**Compressors**.....Balanced/Opposed compressors with overhung rotor construction, feature easier installation & less maintenance, simpler design & less floor space. Facts.  
109 \*Clark Bros. Co.

**Compressors, Centrifugal**..... design is capable of sealing against pressures of more than 1000 psi, for utmost dependability in processing service. Information.  
44-45 \*Cooper Bessemer

**Industrial Fans**.....remove metal dust chips, sawdust, grains. Convey long fibrous materials. Handle air, exhaust fumes, gases, smoke. Further information on request.  
161 \*Westinghouse Electric Corp.

**Motorpumps**.....with capacities from 5 to 2800 gallons per minute; heads to 650 feet. Easy to install. Specifications and performance data available.  
250 \*Ingersoll-Rand

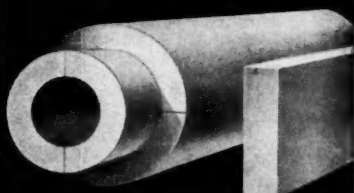
**Pump**.....Will pump ceramic slip, abrasives, molten metals (up to 2000 F.), acids, syrups, greases, medicines, sludge etc. Non-contaminating & easy to maintain.  
346-347 \*The Crossley Machine Co.

\*From advertisement, this issue



**RUBEROID**  
**Calsilite**  
**ONE-LAYER**  
**INSULATION!**

Now a modern molded calcium silicate insulation for use on today's high temperature pipes and vessels. Insulates with only *one* layer, providing a constant co-efficient of conductivity. Available in various thicknesses of pipe coverings and blocks, Calsilite is insoluble in water, can withstand normal acids and alkalis . . .



**FOR SOAKING HEAT**  
**UP TO 1250° F!**

•  
**Light weight**

•  
**Resists abuse**

•  
**Easy to cut  
 and mitre**

•  
**One layer does  
 the complete job**

•  
**Absorbs moisture  
 without disintegration**

For complete details, see  
 Chemical Engineering Catalog  
 or Sweet's Catalog.

Send your inquiry to:

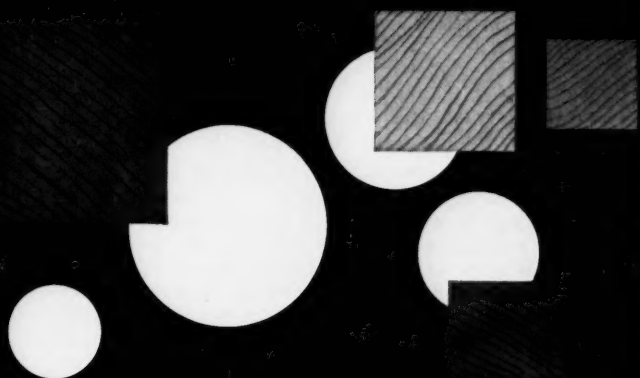
**The RUBEROID Co.**®

**INDUSTRIAL PRODUCTS DIVISION**

500 Fifth Ave., N. Y. 36, N. Y.

PIONEERS IN CALCIUM SILICATE INSULATION

**How many of Your Scales are**  
**SQUARE Pegs in ROUND Holes?**

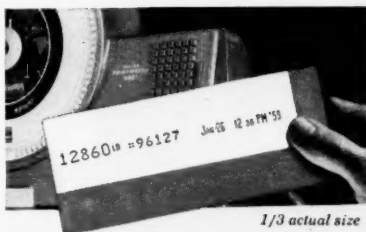


**Accuracy alone is not enough**  
**... Scales must fit the job**

Scales that were right for their jobs in your plant yesterday may be "misfits" today. This can easily happen as a result of *changes* in plant layout, materials handling, inventory controls, or in value or quantity of materials weighed.

And misfit scales can bottleneck production, infect your weight records with costly errors, slow down materials handling, undermine inventory controls—product quality—customer goodwill!

Be sure your scales are not just 100% accurate, but 100% *adequate*, too. We will gladly arrange for an adequacy test to cover any or all of your scales. A few minutes at each weighing station will give you the facts on scale capacity and location, dial visibility, platform size and height and other factors that determine *scale adequacy*. Address: TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio.



1/3 actual size

**NEW TOLEDO PRINTWEIGH "400"**

Prints **complete** weight records on tickets or sheets, also on strips. Full-figure printing, even when unit weights are used. Positive weight identification, with selective numbering, weight symbols, or consecutive numbering. Time and date printing available. Transmits weight data for recording by remotely located office machines, if desired. Ask for Bulletin 2017.

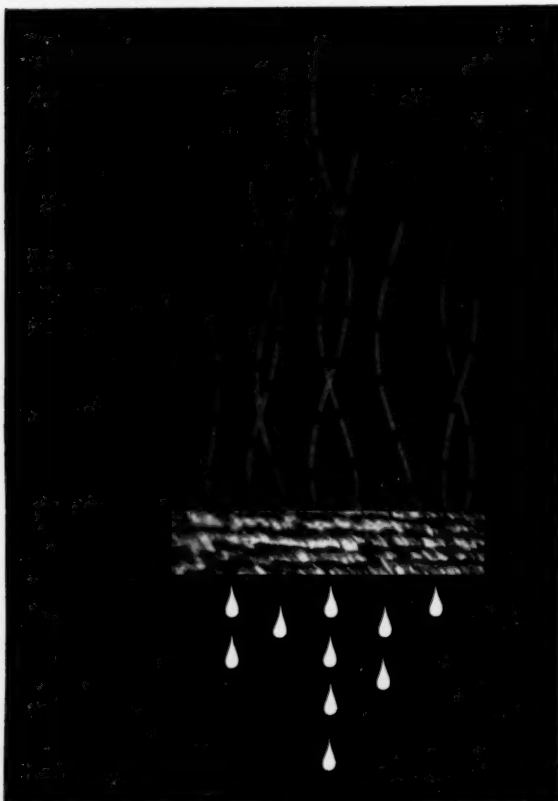


**TOLEDO**®  
 Headquarters for Weighing Systems

# METEX MIST ELIMINATORS

## THE LOW COST, HIGH EFFICIENCY WAY TO CONTROL LIQUID CARRY-OVER

Your liquid entrainment problems are solved faster, more economically when you call on the engineering and production experience of Metal Textile. ■ As the originators of knitted wire entrainment separators for the processing industry—Metal Textile has been consistently first in advancing the art...developing special meshes...introducing new materials...applying new techniques to meet specific application requirements. Just recently, for example, Metex has introduced entrainment separators in polyethylene—marking a new high in corrosion resistance, and fiberglass—for coalescing sub-micron particle mists. As the oldest and largest company in the field today—Metal Textile has the engineering experience—and the necessary research and production resources to back it up—to take on the most challenging entrainment problems. ■ Our engineering department stands ready to help you solve your specific problems with complete design assistance. For latest design guides, write or call for Bulletin ME-9: Metal Textile Corporation, Roselle, N. J.



**METAL TEXTILE CORPORATION**  
...world's largest and oldest producer of knitted wire products  
A DIVISION OF GENERAL CABLE CORPORATION

### LITERATURE . . .

- Pump**.....External Gear & Bearing Screw Pump, available in an almost endless number of patterns, can solve special space or pipe or problems too. Details in Bul. 206. 380 \*Warren Pumps, Inc.
- Pump**.....Chemical positive displacement pump incorporates many features such as: twin-balanced impellers, helical timing gears for smooth operation, etc. Cat. F302. 297 \*Waukesha Foundry Co.
- Pump, Chemical**.....Bulletin 440 contains typical applications, flow charts, descriptions & specifications of Pulsafeeder models of various capacities & construction. 99 \*Lapp Insulator Co., Inc.
- Pump, Glassed**.....Booklet gives the facts about the glassed pump that is the answer to your corrosive-pumping problems. Only pump of its kind. 806 \*Goulds Pumps, Inc.
- Pumps, Chemical Feed**.....Precision built 200 Series pumps handle a wide variety of "tough" corrosive materials. Metering accuracy of  $\pm 1\%$ . Capacity to 1824 GPH. 348 \*American Meter Co.
- Pumps**.....Aurora Centrifugal and Apco Turbine types are available in a broad range of types & sizes to various capacity & head requirements. Complete information. 64 \*Aurora Pump Div., N. Y. Air Brake
- Pumps**.....Archimedean screw principle utilizing rubber-to-metal wiping action for viscous & abrasive liquids. Further details in bulletin including table of capacity, etc. 408 \*Goodyear Pumps Inc.
- Pumps**.....Dependability is imperative. If you have equipment that requires constant circulation of liquids, Bulletin 725.6 is available. 80a \*Goulds Pumps, Inc.
- Pumps**.....Top ability to resist corrosion & top ability to move liquids economically & dependably are combined in these chemical pumps. Facts contained in Bul. 8-1b. 397 \*The LaBour Company, Inc.
- Pumps**.....that are easily and quickly installed & need a minimum of maintenance & down time. Handle your chemical feeding problems. Further information. 101 \*Precision Chem. Pump Corp.
- Pumps**.....Moyno pumps are available in nine sizes with capacities ranging from minimum metering flow to 500 gpm & pressures from zero to 1000 psi. Bul. 30CE. 359 \*Robbins & Meyers, Inc.
- Pumps**.....move corrosive liquids, feed & mix, pump 2 or 3 different liquids simultaneously, meter additives. Capacities from 0.5 cc. per min to 4.5 GPM. Information. 370 \*Sigmamotor Inc.
- Pumps**.....The new series "H" Microvac pumps are compact, balanced & quiet. Models with up to 600 c.f.m. displacement. Complete literature & application assistance. 328 \*F. J. Stokes Corp.
- Pumps, Close-Coupled**.....are powered by Super-Seal motors with Foxseal insulation. Capacities to 2500 gpm, heads to 550 ft. Details on request. 257 \*Allis-Chalmers

\*From advertisement, this issue

# AUTOMATE

At Any  
RATE



*Graham*

## VARIABLE SPEED DRIVES . . .

give you the Accuracy, Wide Range and Reliability of a mechanical drive in combination with your present electrical or pneumatic control system or new controls if needed.

## COMPARE THE GRAHAM

All speeds from top to zero . . . Utmost accuracy of set, holding and reset . . . Remote control accuracies up to 1/25 of 1% . . . Immediate response to control signal . . . Controllable from 3 to 15 psi, 0.5 to 5 ma, or signals from any electrical transducer . . . Utilizes analog, frequency or parallel binary signals.

## CONTINUOUS FLOW FORMULA CONTROL - PUNCH CARD BLENDING

The Graham is excellent for low cost, punch card blending of multiple components (volumetric and/or gravimetric) with high formula accuracies. Perfect for a variety of dry or liquid chemicals, grains, flours, aggregate, and petroleum products.

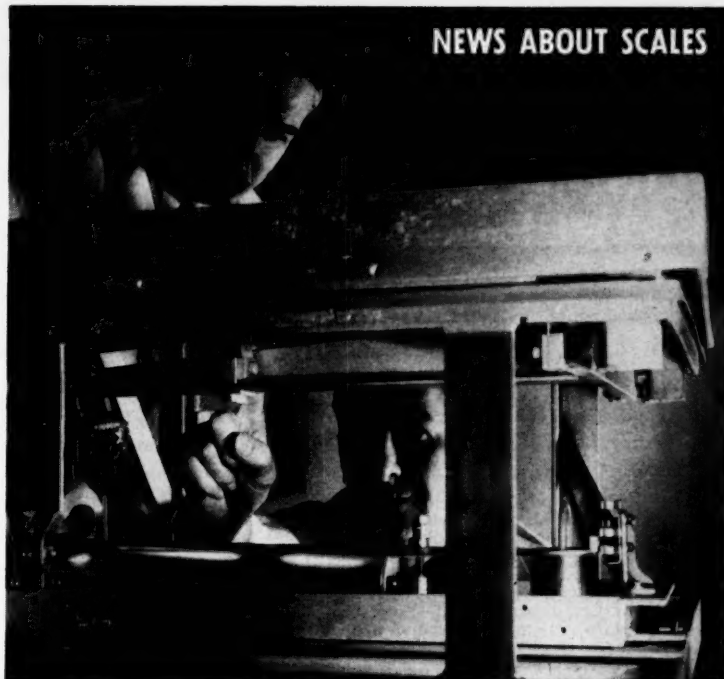
Ask for Graham Catalog 550.



*Graham*

TRANSMISSIONS, INC.  
Menomonee Falls, Wisconsin

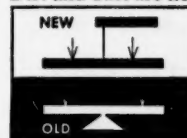
## NEWS ABOUT SCALES



## How do they build unvarying accuracy into this remarkable new kind of weighing instrument?

For 7,000 years men have employed the multi-part pivot balance to compare weights. As the parts of their pivot joints wore, the problem of retaining accuracy became more and more acute. Then in 1956 the United States issued a patent for a "Thayer Flexure Plate" Leverage System. A team of engineers and businessmen, aware of industry's great cumulative loss of materials in weighing operations, had devised a revolutionary new scale. Knife-edge pivots that progressively wear and change were replaced by Thayer Flexure Plates that move only .001", yet accurately reflect the minutest changes in weight. This firmly joined lever withstands

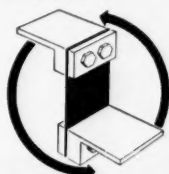
shocks and vibrations indefinitely. Dirt and dust are no longer a problem.



Thayer guarantees this leverage system accurate for the life of the scale.

### How Can It Save You Money Year After Year?

Working in conjunction with straight electrical controls, it forms the most reliable, low maintenance system ever devised to control processing or materials handling by weight. Literature on its application to filling, batching and checkweighing operations is available on request.



## THAYER SCALE

AUTOWEIGHTION SYSTEMS FOR FILLING,  
BATCHING AND CHECKWEIGHING

THAYER SCALE CORP. THAYER PARK PEMBROKE, MASS.

FOR FURTHER INFORMATION SEE PAGE 599  
OF THE NEW CHEMICAL ENGINEERING CORP

# NEW! IMPROVED!

## DINGS INDUCED ROLL SEPARATOR

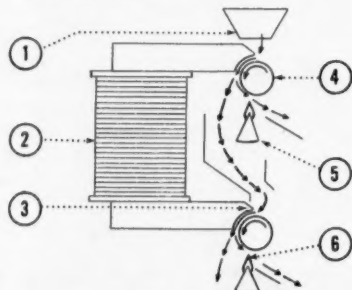
High Intensity Purification  
and Concentration for  
Higher Quality Products

Here's the way to cut beneficiation costs and make greater profit with highest quality products. The newly improved design of Dings Induced Roll Separator permits highest capacities in separation of weakly magnetic materials. New pole nose contour attains tremendous magnetic intensity at separation zone. Adjustable knife-edge dividers assure extremely critical separation.

Result: In beneficiation of nearly every type of dry, granular material, you get higher quality product . . . in greater volume . . . at lower cost!

### You Make More Money with these improved features

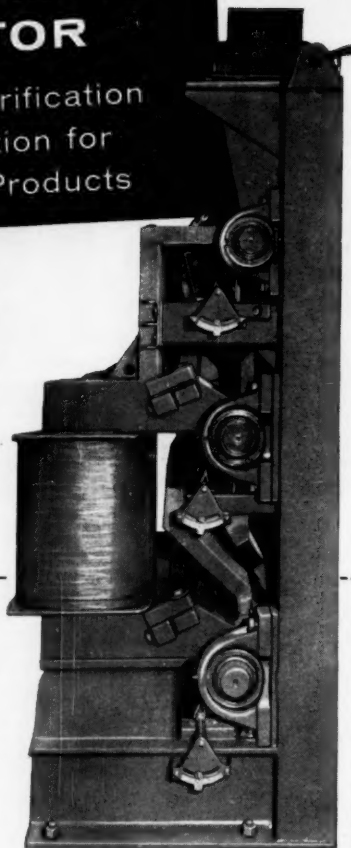
- New pole nose contour provides maximum intensity through 37.5 degrees of rotor arc
- Increased flux density from new magnetic circuit
- Magnet coil of anodized aluminum wire for longer life
- New vernier dial for accurate divider settings
- New slim-line frame design saves 52% of floor space
- Bearings are self-aligning, sealed, anti-friction type
- New feed distributor has no moving parts
- Efficient separation at capacities up to 800 lbs. per inch of rotor width per hour.



- |                    |                      |
|--------------------|----------------------|
| ① Feed distributor | ④ Laminated roll     |
| ② Magnet coil      | ⑤ Vernier dial       |
| ③ Magnet pole nose | ⑥ Knife-edge divider |

### DINGS MAGNETIC SEPARATOR COMPANY

4716 W. Electric Ave., Milwaukee 46, Wis.



### HERE'S HOW IT OPERATES

Material flows over the roll and through the smallest possible air gap between roll and pole nose. High intensity magnetic field lines passing through the air gap converge on the numerous edges of the laminated roll and deflect weakly magnetic particles in the direction the roll is turning. Non-magnetic particles follow a normal trajectory. Adjustable divider cleanly separates magnetics and non-magnetics. Intensity of each roll can be altered to control the amount of magnetics removed. Dings IR Separators available with 1 to 7 rolls in 2" to 30" widths. Write for complete details.



### LITERATURE . . .

#### Services & miscellaneous

**Drum Dispensing** . . . . .Stainless steel construction eliminates corrosive action & contamination of liquids. No leakage. Flammables & corrosives dispensed safely. File No. 68. 363d \*The Protectoseal Co.

**Engineering Service** . . . . .includes: a comprehensive survey of your facilities, installation supervision, periodic inspection, etc. Complete details offered. 133g \*Becco Chemical Div., FMC

**Etching** . . . . .Tank immersion etching of printed circuits with Ammonium Persulfate is completely described in Booklet No. 99 which is now offered to you. 133d \*Becco Chemical Div., FMC

**Etching** . . . . .Booklet No. 102 features complete information on etching of printed circuits with Mercury Activated Persulfate. These facts are available to you. 133e \*Becco Chemical Div., FMC

**Fabrication** . . . . .Brochure "Working with Metal" outlines long experience with metals; carbon, high-tensile & stainless steels, wrought iron, aluminum & others. 404 \*The Boardman Co.

**Filter Fabrics** . . . . .Complete information about filter fabrics is contained in a handy booklet. Specialists can help you select the medium that best answers your problems. 73 \*Wellington Sears Co.

**Fire and Explosion Prevention** . . . . .pamphlet outline safeguards for fire prevention, dust collection, fire protection, and disposal of waste materials. No. 1534. 129-130f \*U. S. Industrial Chemicals

**Flammables Handling Equipment** . . . . .Engineers design & build custom special-purpose equipment to meet individual requirements. Details in Special Metal Containers File 74. 363c \*The Protectoseal Co.

**Flammable Liquids Storage Cabinet** . . . . .may be located close to work station . . . within the plant or laboratory. Built to N.F.P.A. specifications. File No. 55. 363b \*The Protectoseal Co.

**Gas and Hose Masks** . . . . .New face-piece now on market. Features easily replaceable, large single lens, improved speaking diaphragm, no fogging. No. 1536. 129-130g \*U. S. Industrial Chemicals

**Laboratory Safety Equipment** . . . . .features space-saving shelf storage, fire-safe accurate dispensing and fast controlled waste disposal. Information in File No. 67. 363a \*The Protectoseal Co.

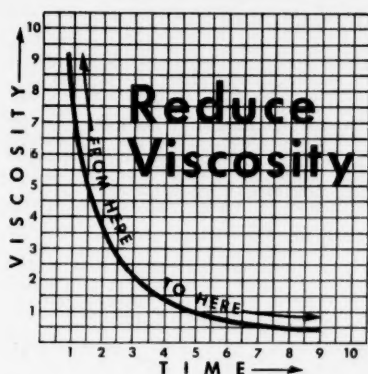
**Lubricating System** . . . . .Dualine System for positive lubrication of large, medium & heavy-duty installations. Bulletin 26-T containing complete engineering information. 141 \*The Farval Corp.

**Metal Treatments** . . . . .Booklets Nos. 39 and 51 completely outline the surface treatment of metals with Peroxygen Compounds. Now available on request. 133a \*Becco Chemical Div., FMC

\* From advertisement, this issue



## Speed Handling OF HEAVY STICKY MATERIALS



The best method for making heavy, viscous materials flow more freely is to apply heat—and the best way to apply heat is through Parks-Cramer jacketed piping, valves and fittings. It is axiomatic that the greater the heating surface, the faster the heating; and, the less viscous the product becomes, the easier it is to handle. These conditions are met by full jackets completely surrounding all product wetted surfaces—thus utilizing maximum heat transfer area.

**Parks-Cramer jacketed equipment** is also designed with large radii internal contours, extra metal thickness in walls and flanges, jacket tappings amply sized and properly located—all combined to give highest efficiency to viscous fluid handling.

The largest selection of jacketed piping accessories is available in materials ranging from semi-steel (in stock) to carbon and alloy steel, bronze, aluminum, Ductile Iron, Ni-Resist, and plastic lined in sizes from 1¼" to 8". Complete facilities including engineering, scheduling, and installation as well as unit sales are available.

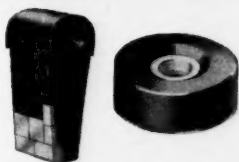
Send for Catalog 356 and supplement 356-S for complete details.



# Reliability is a most important characteristic of KENNAMETAL\*

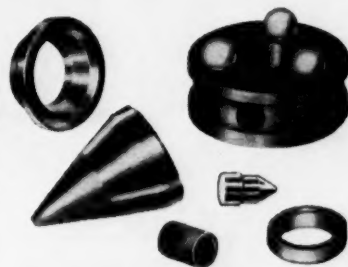
Exceptional characteristics of Kennametal have solved varied problems in many fields. But one of the most important contributions made by Kennametal to any project is *reliable performance*... delivering the expected service and life under given conditions. That's why Kennametal is used more and more where it is found or feared that other materials just aren't good enough.

**Will these dependable characteristics of KENNAMETAL hard carbide alloys help solve some of your problems?**



**DEPENDABLE resistance to abrasion**... for such component parts as spray nozzles, orifices, seal rings, bushings, pulverizing hammers, drawing and compacting dies.

**DEPENDABLE resistance to corrosion, cavitation and wear**... vital to valving in oil well operations, hydraulic systems, parts for chemical processing equipment exposed to strong mineral acids, red fuming nitric acid and similar highly corrosive agents.



**DEPENDABLE strength at high temperatures**... needed for gas turbine components, sensing elements for jet stream thermostatic controls, parts to handle or process glass in semi-plastic state and flame burner tips. For such applications, Kentanium,\* a series of hard titanium carbide alloys, retains high strength for continuous operation at temperatures up to 2200°F and provides high stiffness/weight ratio.

**DEPENDABLE resistance to deformation**... as required in cylinder liners to prevent leakage around pistons when compressing gases at pressures as high as 35,000 psi, or in components for high pressure valves. (Kennametal has a YME up to 94 million psi, 3 times that of hardest steel.)



For more information, send for: Booklet B-111A, "Characteristics of Kennametal," Booklet B-222, "Designing with Kennametal," Booklet B-444A, "Kentanium." Write to Dept. CE, KENNAMETAL INC., Latrobe, Pa.

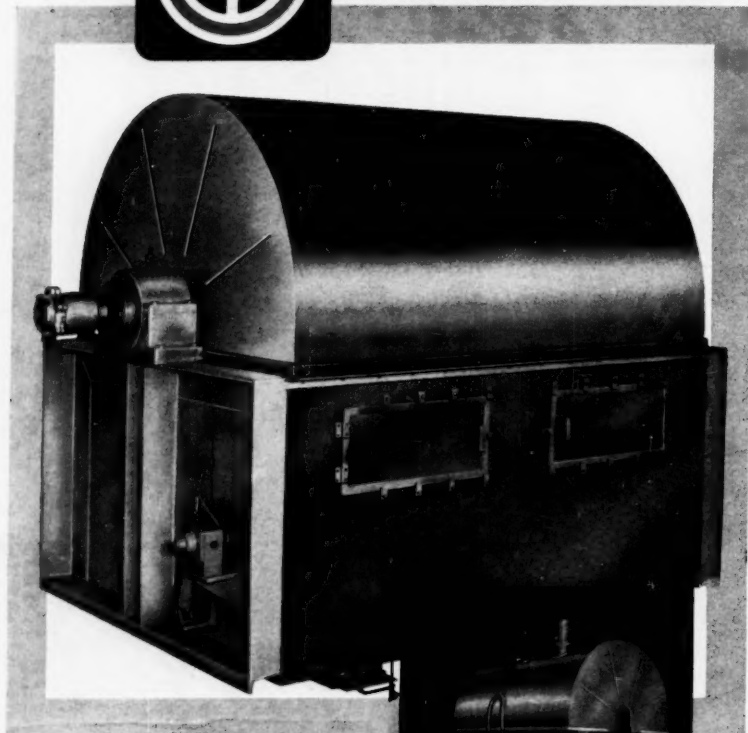
\*Trademark

97250



INDUSTRY AND  
**KENNAMETAL**  
...Partners in Progress

# PLUS FEATURES OF FLAKERS



## ...ASSURES GREATER OPERATING EFFICIENCY

This 60" dia. x 72" flaker was designed and built for a major chemical company to convert molten organic chemicals to solid flakes. The unit features:

- Air operated knife holder
- Special monel construction double shell drum
- Enclosure confines obnoxious vapors
- Feed pan projects to rear for access to and inspection of overflow adjustment

More detailed information on this and other G-B designed and built equipment is yours for the asking.



**GOSLIN-BIRMINGHAM  
MANUFACTURING CO., INC.**  
BIRMINGHAM, ALABAMA  
FILTERS • EVAPORATORS  
PROCESS EQUIPMENT  
CONTRACT MANUFACTURING  
including HEAVY CASTINGS

### LITERATURE . . .

**Metal Treatments.**.....Complete information on improving properties of Copper and Brass surfaces is contained in Booklet No. 86 which is now available.

133b \*Becco Chemical Div., FMC

**Neoprene Gloves.**.....comfortably flexible. Also waterproof, dirtproof, oil, grease and solvent resistant. Fully curved finger and thumb.

52a \*American Optical Company

**Packaged Oxygen Plant.**.....for the supply of oxygen and/or nitrogen as well as the associated low temp. equip. for: purifying hydrogen & helium, upgrading of natural gas.

139 \*Linde Co., Union Carbide Corp.

**Paddle Etching.**.....Booklet No. 97 gives complete details on paddle etching of printed circuits with Ammonium Persulfate. It cleans fine, metal resists retarnishing.

133c \*Becco Chemical Div., FMC

**Portable Fire Extinguishers.**.....Two new stainless steel portables feature simple, one-two operation. Slim design & light weight for easy storage & handling. Information.

258 \*Walter Kidde & Co., Inc.

**Plants.**.....Technical consultations, design work, manufacturing of plant & equipment, to the expert erection & start-up supervision. Information available.

156 \*American Air Liquide

**Plants.**.....The new booklet about "The Plant You Want To Build" is now available on request. Details about profits from chemicals & many other "profit ideas".

173 \*Foster Wheeler

**Plastic Gloves.**.....special polyvinyl resin makes these gloves 100% liquid-proof. Offer wear resistant protection from jagged or sharp surfaces. Seamless comfort.

52b \*American Optical Company

**Safety Waste Containers.**.....prevent hazardous pyramiding of wastes within the plant . . . keeps plant & lab premises safe, orderly. Information in File No. 57.

363e \*The Protectoseal Co.

**Skin Lotion.**.....to keep hands free from drying solvents has been developed for use by chemists and clinicians working with acetone, methanol, ether, alcohol, etc.

\*U. S. Industrial Chemicals Co.

**Sodium Wire.**.....New data sheet includes photo, diagrams, complete description of equipment; extrusion method; typical reaction of the wire. No. 1538.

129-130h \*U. S. Industrial Chemical Co.

**Structures.**.....Design, engineering, fabrication & erection of steel plate structures. Bulletin on: Special Plate Structures & Field Services are available.

8-9 \*Chicago Bridge & Iron Co.

**Tank Cleaning.**.....Details about tank cleaning equipment including the interior tank cleaning unit, model 531. Also details of cleaning methods for the chemical industry.

256 \*Oakite Products, Inc.

**Tools.**.....The 5172-GS-B set is complete enough to handle practically all of your general service requirements. 172 tools in one portable "quick-select" chest. Details.

254 \*Snap-On Tool Corp.

\* From advertisement, this issue

# *Chemical Engineering*

NOVEMBER 16, 1959

**your  
complete  
guide  
to**

## **1959 CHEM SHOW**

Events of Chem Show Week.....	282
Preview of Show Highlights .....	283
Floor Plan of Exhibits .....	284
Alphabetical List of Exhibitors .....	288
List of Exhibitors by Products .....	304

# Chem Show Week November 30 through December 4

27th Exposition of Chemical Industries, New York Coliseum, Columbus Circle

Monday: Noon-10 pm., Tuesday: 10 am.-6 pm., Wednesday: 10 am.-6 pm., Thursday: 10 am.-10 pm., Friday: 10 am.-6 pm.

## Special Events—Tuesday (Dec. 1)

**Chemical Engineering-Chemical Week Kirkpatrick Awards Dinner, Hotel Astor Grand Ballroom**

Reception, 7 pm.

Dinner, 8 pm.

Award Recipients

For Management Achievement—Chemical Divisions, Food Machinery & Chemical Corp.

For Chemical Engineering Achievement—Texaco, Inc.

Speaker

Dr. T. Keith Glennan, Administrator, National Aeronautics and Space Administration:—"Framework of Achievement—1959"

Reservations, \$25

Chemical Engineering-Chemical Week Editorial Offices, 330 West 42nd St., New York 36, N. Y.

## Special Events—Wednesday (Dec. 2)

**Dinner meeting, New York Section, American Institute of Chemical Engineers, ESSO dining room, 2nd floor (above Schraffts), 15 W 51 St., New York**

Cocktails, 5:30 pm.

Dinner, 6:00 pm.

Speaker

Dr. George B. Kistiakowsky, Special Assistant on Science & Technology to President Eisenhower—"Science, Technology and National Vitality"

Reservations, \$4.25

Tod Knowles, Empire Trust Co., 7 West 51 St., New York, JU 2-5900

**Dinner meeting, New York Section, American Chemical Society, Henry Hudson Hotel, 353 West 57th St., New York**

Cocktails, 5:30 pm.

Dinner, 7:00 pm.

Speaker

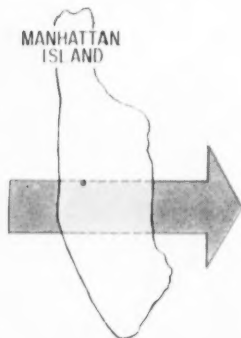
Dr. C. Guy Suits, Vice Pres. for Research, General Electric Co.—"New Methods of Energy Conversion"

Reservations, \$8.25

Dr. Thomas Hall, Union Carbide Nuclear Co., 30 East 42nd St., New York 17, N. Y., MU 7-8000

## Welcome to Chemical Engineering booth 432-481

Chemical Engineering editors will be there to greet old friends and meet new ones.







## View and Compare Values at 1959 Chem Show

- Equipment
- Chemicals
- Raw Materials
- Laboratory Equipment and Supplies
- Engineering Services

**L**ONGTIME contributor to chemical process progress, the Exposition of Chemical Industries (Chem Show) opens for its 27th showing at noon, Nov. 30, in the New York Coliseum. By week's end, some 40,000 CPI showgoers will have examined and compared more than 500 exhibits, will have come away with arms full of pamphlets and heads full of ideas.

On display will be a vast array of capital goods for equipping process plants, raw materials and chemicals to feed these plants, high-specification products manufactured in these plants and engineering services available to bring such plants into being. At each display, competent engineers will stand ready to show you what's new and offer expert help in selection of equipment, goods and services for your requirements.

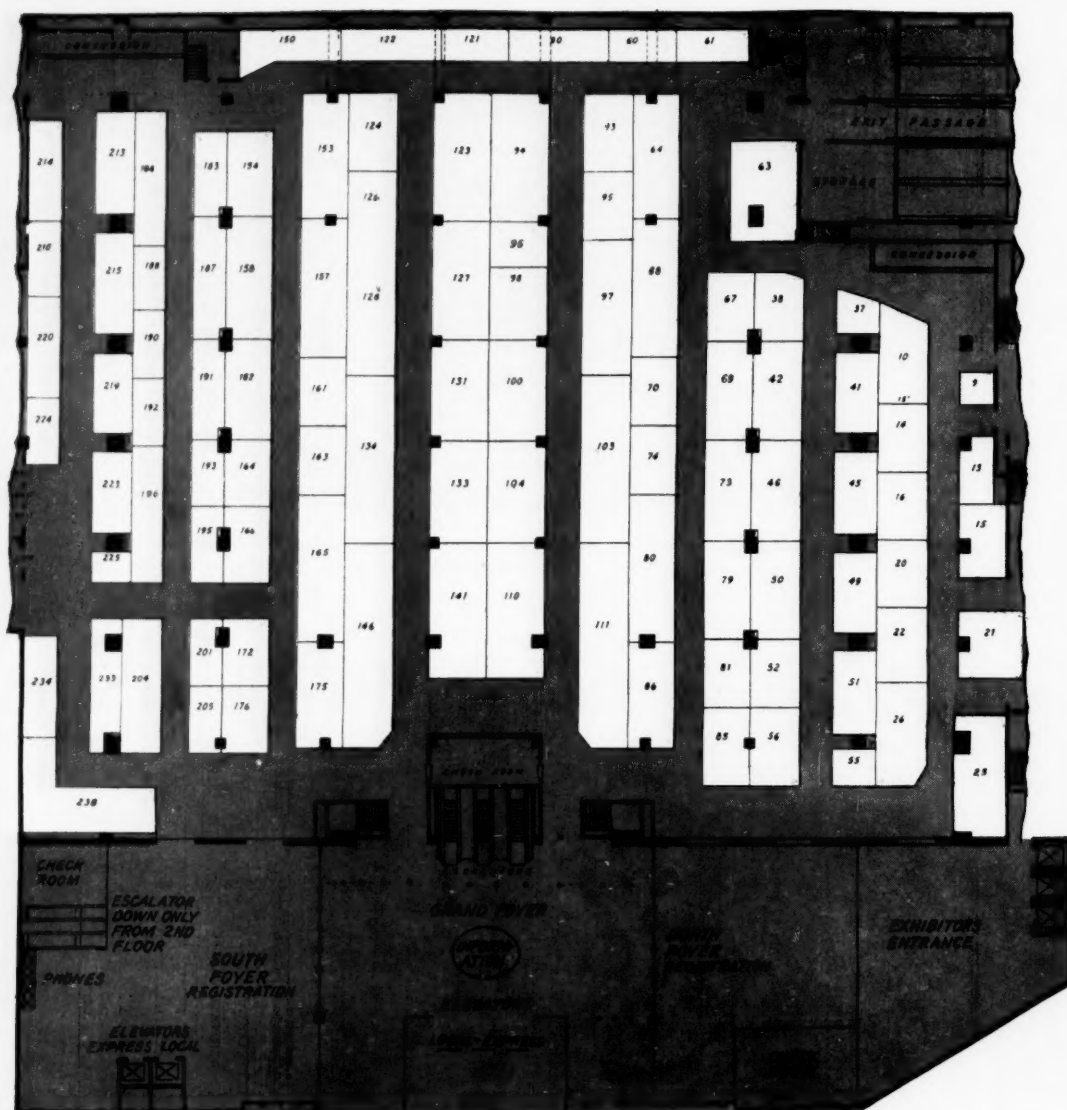
Here's a brief sample of a few things

these fellows will display and talk about:

► **Nitrogen and Hydrogen**—You'll see units that economically generate small volumes of liquid nitrogen and high purity gaseous hydrogen. Available for completely instrumented, continuous operation, the hydrogen generator produces 1,000-10,000 cu. ft./hr. of purified gas with  $-100^{\circ}\text{F}$ . dewpoint.

► **Molecular Stills**—Long used in laboratory and pilot plant operations, centrifugal molecular stills appear at this year's show in continuous production sizes that handle from 400 to 4,000 lb./hr. These units separate organic and silicone compounds in the 250-4,000 mole weight range, without degradation.

► **Nucleonics Contributes**—You'll see evidence of nuclear developments integrated into the chemical industries. One example is an acid valve used in five atomic plants,



COLUMBUS CIRCLE

as well as in oil and chemical refineries. Another is a nuclear waste evaporator for reactor containment vessels in upcoming nuclear power stations.

Radioisotopes are employed to energize an entire line of indicating and control systems. Included are a tank level detector controller, a continuous container-fill system, an individual container fill inspection and rejection system and a density measuring

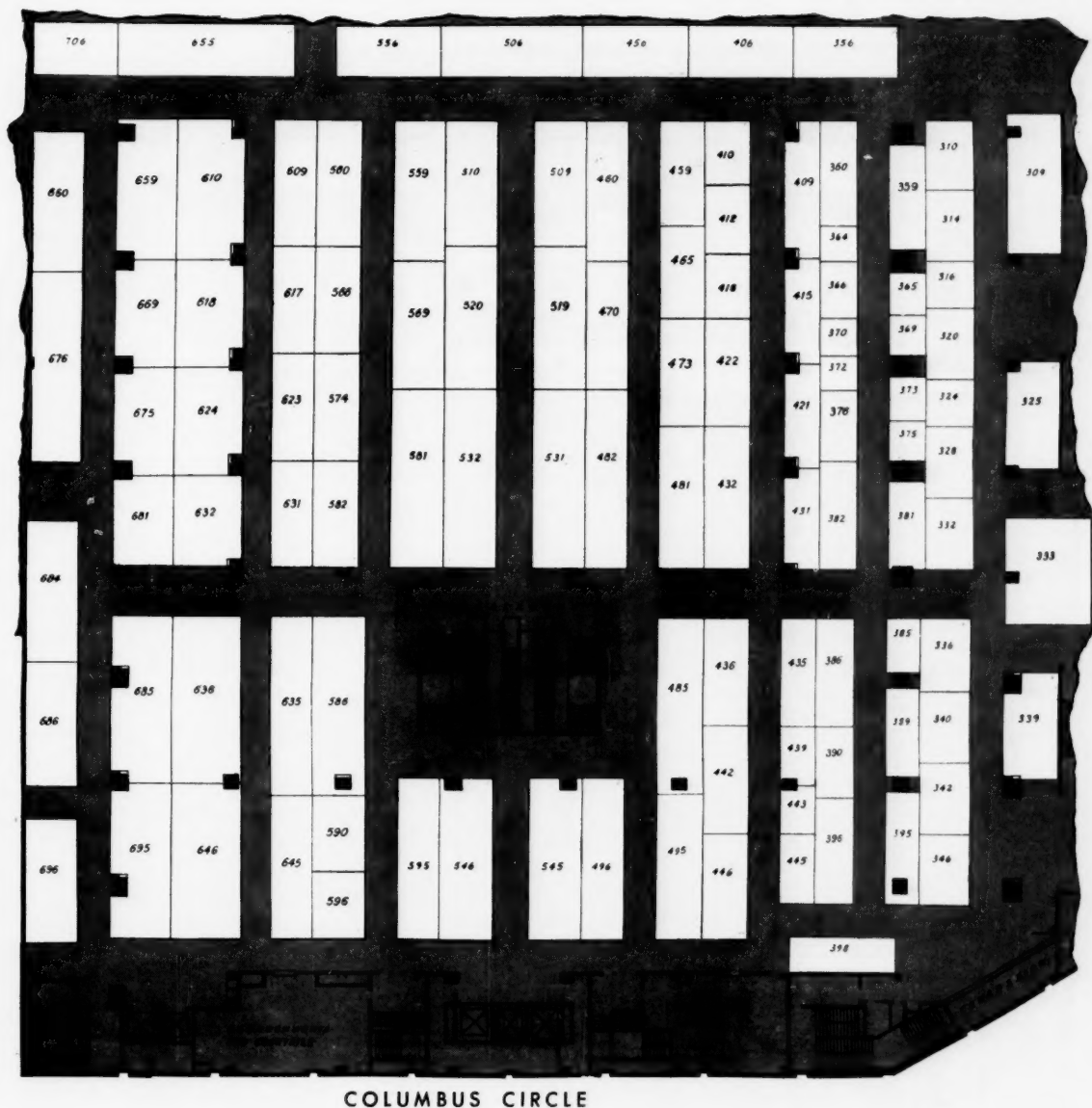
system based on transmission of gamma rays.

► **Fine Particle Probe**—New to the Show this year will be a particle size analyzer that uses an oscillograph. The combined volume of particles suspended in an electrolyte displaces a perceptible quantity of the liquid. When passed through an aperture, this suspension pulses the voltage of a test current which can be shown on an oscillograph. Nature of the

pulses is a measure of particle size.

► **New Materials**—In the fast-moving materials field there is a new elemental amorphous carbon fiber, available in seven standard grades of "wool" with various fiber diameters, both activated and unactivated. Glass will win new recognition in a new type woven glass filter bag which collects process dust and fume up to 550 F.

Other noteworthy advances are



the first plastic filter plates ever produced commercially by injection molding, the first all-plastic filter press headers, a new line of polypropylene filter cloths and a full line of polytetrafluorethylene plastic products from France in sheet, tube, fabric and molded forms.

► **Fluids Handling**—Be sure to check on new fluids-handling developments such as aluminum pipe with thickened ends, that facili-

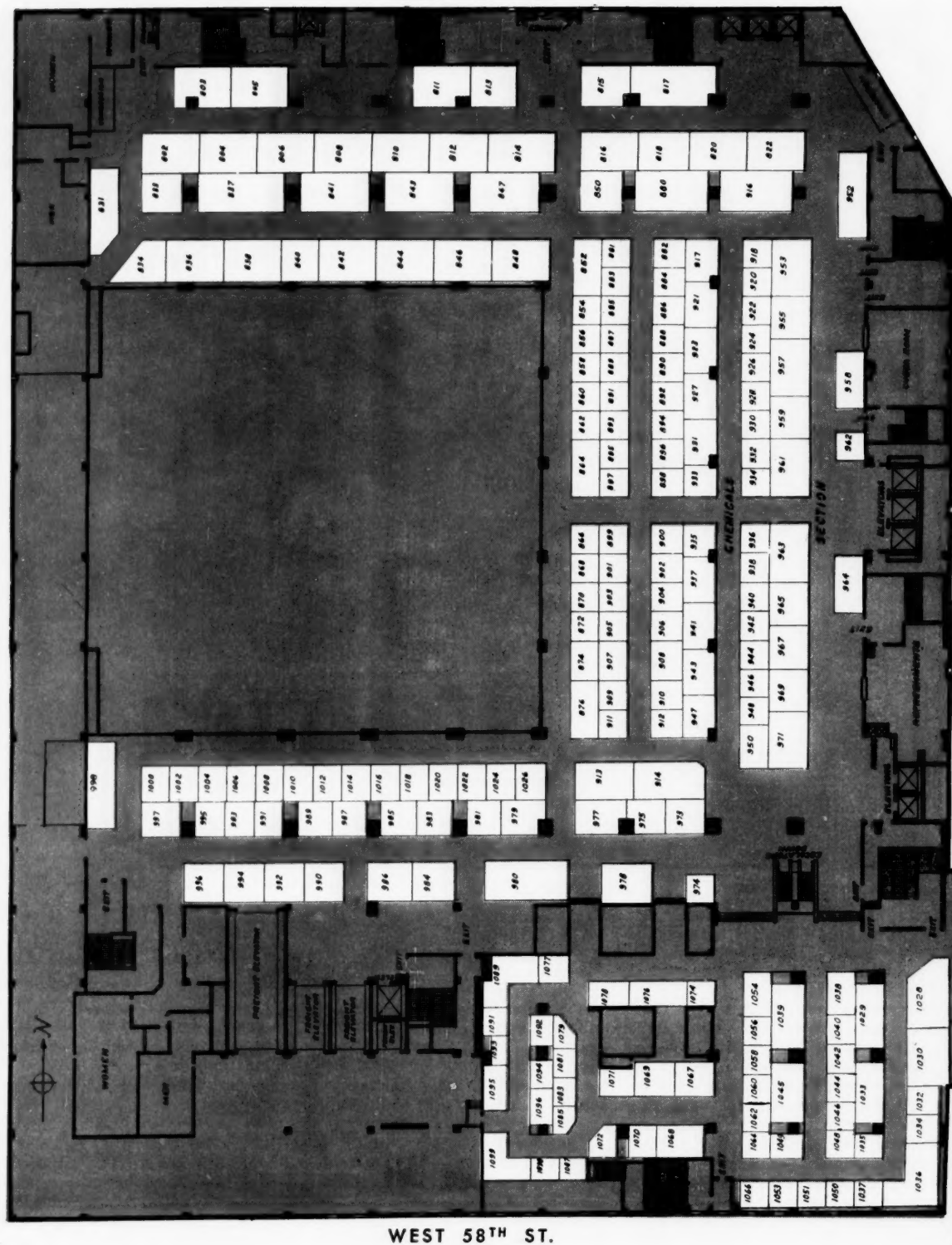
tate joining, and a new line of light-wall stainless steel fittings and flanges. And you will find a number of new valve designs ranging from one for small volumes of highly viscous fluids to newer pinch-type and round-ported sliding gate valves.

► **New Chemicals**—In the chemical materials section will be a line of "idea" chemicals, taken out of the laboratory and developed into finished products such as an anti-

stalling agent for gasoline, anti-caking agents for hygroscopic materials and a new class of compounds believed to have advantages over cationic surfactants in solubility and compatibility.

► **Process Supplies**—Among chemical processing supplies look for a line of all-metal long-life catalysts having low pressure drop, excellent heat transfer traits, freedom from spalling and operating cycle over 20,000/hr.

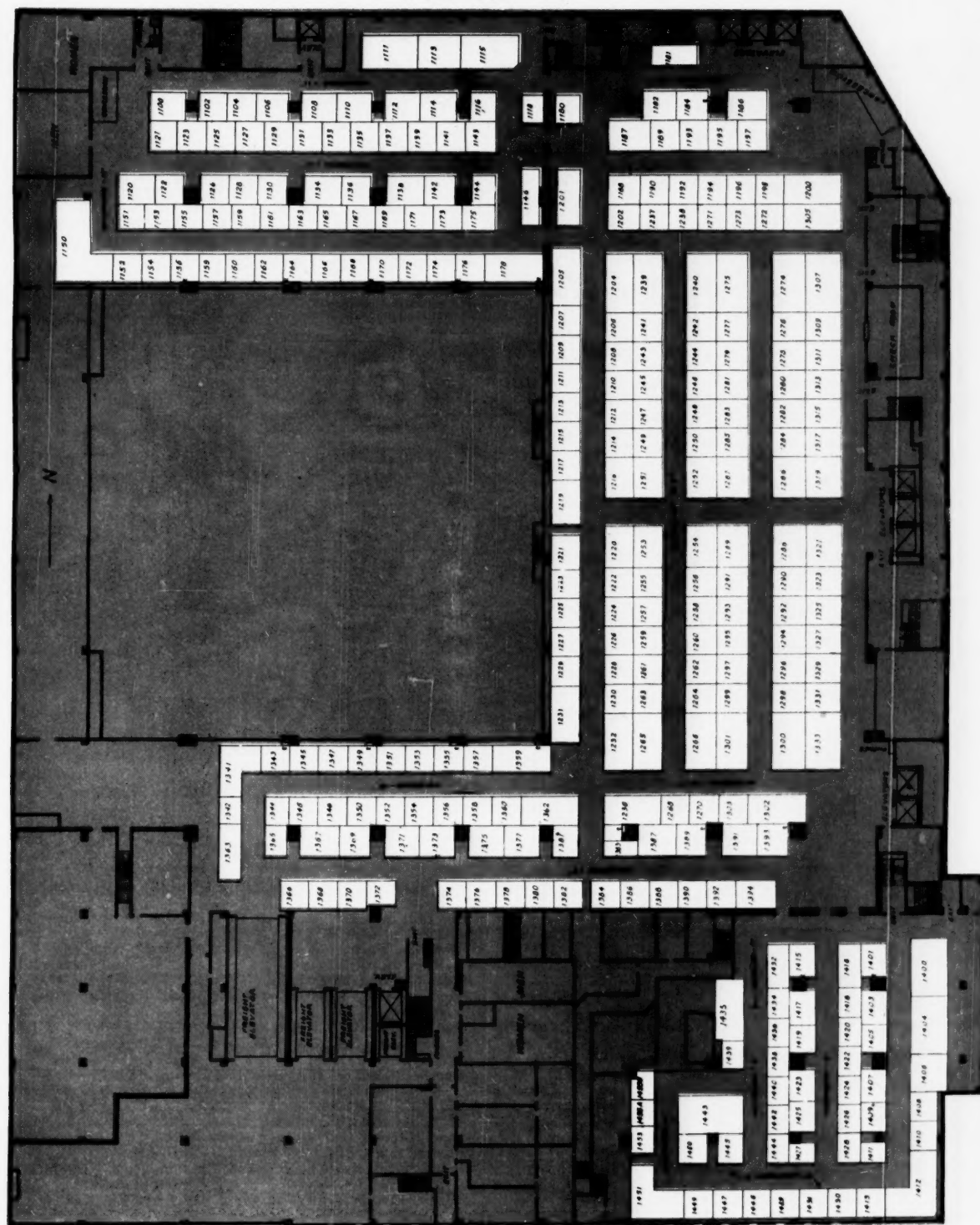
WEST 60<sup>TH</sup> ST.



WEST 58<sup>TH</sup> ST.



WEST 60TH ST.



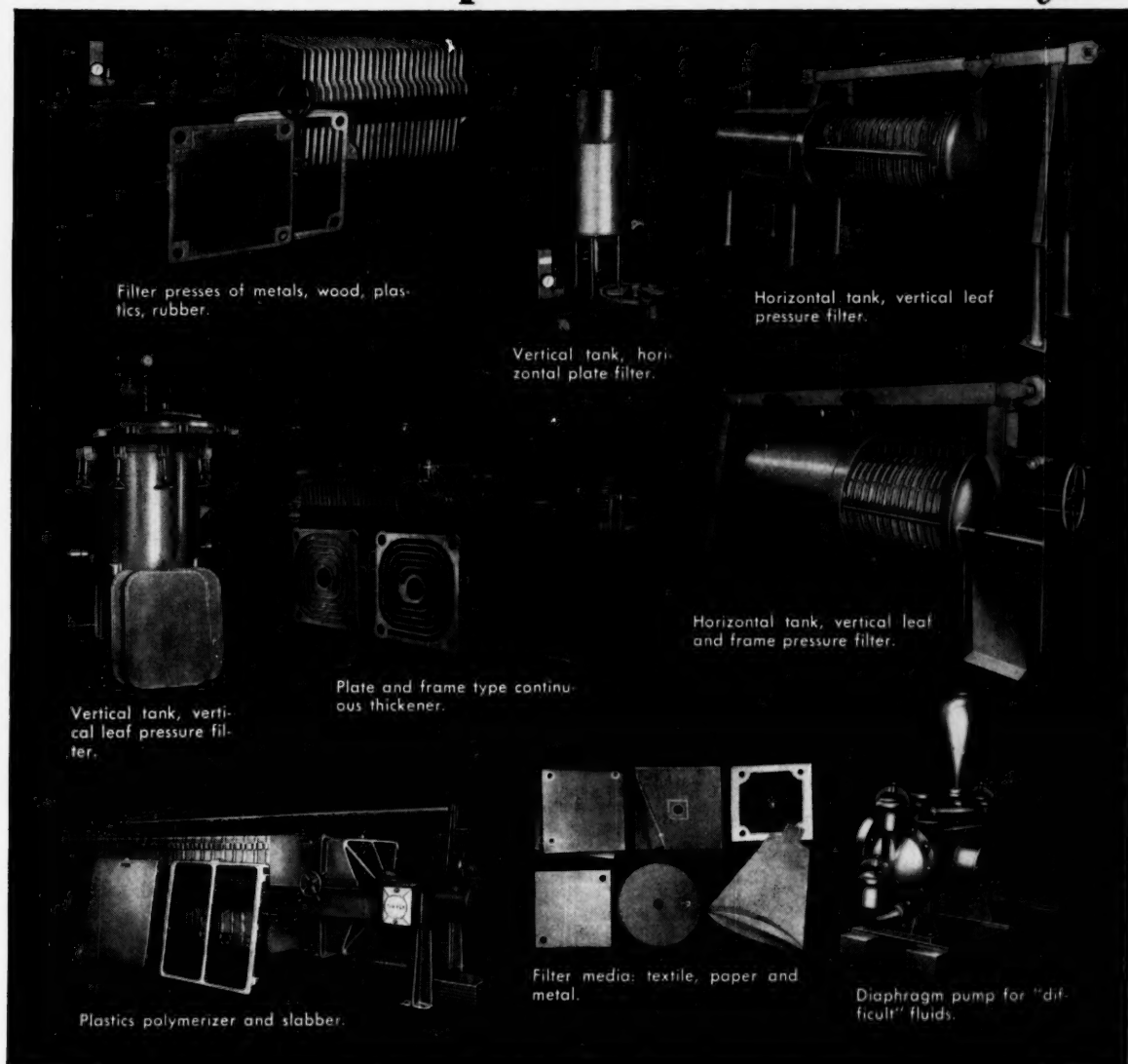
# Line-up of Exhibitors

27th Exposition of Chemical Industries Nov. 30-Dec. 4, 1959, New York Coliseum

	Booth		Booth
*ACF Industries, Inc., W-K-M Div., P. O. Box 2117, Houston 1, Tex. ....	941	Ampero Metal, Inc., 1745 S. 38 St., Milwaukee 46, Wis. ....	412
A.P.V. Co. Inc., 137 Arthur St., Buffalo 7, N. Y. ....	1302	Analytical Chemistry, 430 Park Ave., New York 22, N. Y. ....	86
Abbe', Inc., Paul O., Little Falls, N. J. ....	984	1155 16 St. N. W., Washington 6, D. C. ....	410
*Adams Co., Inc., R. P., 225 East Park Dr., Buffalo 17, N. Y. ....	836	Analytical Measurements, Inc., 585 Main St., Chatham, N. J. ....	314
*Aeroquip Corp., Jackson, Mich. ....	1255	Anderson Co., V. D., Div. of International Basic Economy Corp., 1935 W. 96 St., Cleveland 2, Ohio. ....	1265
Airetool Mfg. Co., The, Springfield, Ohio. ....	841	Andrews-Knapp Construction Co. Inc., 23-15 Borden Ave., Long Island City 1, N. Y. ....	175
Airslide—Dry-Flo Car Div. General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442	Ansul Chemical Co., Marinette, Wis. ....	95
Airsonic Industrial Stethoscopes, M. Paquet & Co., Inc., 17 Battery Pl., New York 4, N. Y. ....	1374	Appareils Gachot, 179, ave. de la Division-Leclerc, Boite Postale No. 16, Enghien (S. & O.) France. ....	1095
Alberene Stone, Div. of Georgia Marble Co., 386 Fourth Ave., New York 16, N. Y. ....	465	*Armco Steel Corp., Middletown, Ohio. ....	1221, 1223
*Aldrich Pump Co., Allentown, Pa. ....	1108, 1110	Armour Industrial Chemical Co., 110 N. Wacker Drive, Chicago 6, Ill. ....	932, 934
Allied Chemical Corp., 61 Broadway, New York 6, N. Y., Divisions Barrett International, *General Chemical, National Aniline, Nitrogen, Plastics & Coal Chemicals, Semet-Solvay, *Solvay Process. ....	955, 957, 959, 961	*Armstrong Machine Works, Three Rivers, Mich. ....	1226
Alite Div., United States Stoneware Co., P. O. Box 119, Orrville, Ohio. ....	111	Armstrong Steam Trap Co., Three Rivers, Mich. ....	1226
*Allis-Chalmers Mfg. Co., P. O. Box 512, Milwaukee 1, Wis.; Industries Group, West Allis Works, Milwaukee 1, Wis. ....	636	Arrowhead & Puritas Waters, Inc., Glass Products Div., 1566 E. Washington Blvd., Los Angeles 54, Calif. ....	1085
*Allis Co., Louis, 427 E. Stewart St., Milwaukee Wis. ....	100	*Artisan Metal Products, Inc., 73 Pond St., Waltham 54, Mass. ....	874
Alloy Products Corp., 1045 Perkins Ave., Waukesha, Wis. ....	1205	Associated Cooperage Industries of America, Inc., 408 Olive St., St. Louis 2, Mo. ....	898
Alloy Steel Casting Co., Southampton, Pa. ....	1076	Autoclave Engineers Sales Corp., 2930 W. 22 St., Erie, Pa. ....	346
Alloy Steel Div. Republic Steel Corp., Oberlin Ave., Massillon, Ohio. ....	68	Automatic Switch Co., Florham Park, N. J. ....	847
*Alloy Steel Products Co., 1300 W. Elizabeth Ave., Linden, N. J. ....	22	Automotive Rubber Co. Inc., 12550 Beech Rd. at P.M.R.R., Detroit 39, Mich. ....	802
Alpine American Corp., 69 Nicholas Rd., Saxonville, Mass. ....	1432, 1434		
Alsop Engineering Corp., Milldale, Conn. ....	381	<b>B</b>	
*Aluminum Co. of America, 1501 Alcoa Bldg., Mellon Sq., Pittsburgh 19, Pa. ....	559	B-I-F Industries, Inc., Builders—Providence-Omega Proportioners Product Divisions, 345 Harris Ave., Providence 1, R. I. ....	660
American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky. ....	676	*Babcock & Wilcox Co., Tubular Products Div., Beaver Falls, Pa. ....	1002, 1004, 1006
American Chemical Society, 1155 16th St. N. W., Washington 6, D. C. ....	406	*Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio. ....	46
American Chemical Society News Service, 2 Park Ave., New York 16, N. Y. ....	410	*Baker Perkins Inc., Chemical Machinery Div., Saginaw, Mich. ....	560 & 609
American Electric Power Service Corp., 30 Church St., New York 8, N. Y. ....	1126	Baker Platinum Div. Engelhard Industries, Inc., 113 Astor St., Newark 2, N. J. ....	192, 196, 225
American Gas Furnace Co., 140 Spring St., Elizabeth, N. J. ....	833	*Barber-Colman Co., Wheelco Instruments Div., Rockford, Ill. ....	395
American Heat Reclaiming Corp., 1270 Sixth Ave., New York 20, N. Y. ....	1058, 1060	Barco Mfg. Co., 500-530 N. Hough St., Barrington, Ill. ....	439
American Hydrotherm Corp., 1055 Jackson Ave., Long Island City 1, N. Y. ....	1161	Barish Pump Co., Inc., 441 Lexington Ave., New York 17, N. Y. ....	1074
American Institute of Chemical Engineers, 25 West 45th St., New York 36, N. Y. ....	1219	*Barneby-Cheney Co., Cassady at Eighth, Columbus 19, Ohio. ....	52
American Instrument Co., Inc., 8030 Georgia Ave., Silver Spring, Md. ....	445	Barnstead Still & Sterilizer Co., 2 Lanesville Ter., Boston 31, Mass. ....	416
*American Machine and Metals, Inc., E. Moline, Ill. ....	456	Bartlett & Snow Co., C. O., 6200 Harvard Ave., Cleveland 5, Ohio. ....	569
American Messer Corp., 405 Lexington Ave., New York 17, N. Y. ....	1083	Beckley, Haltom & Hickman, 1270 Sixth Ave., New York 20, N. Y. ....	1342, 1363
*American Meter Co. Inc., Pump Div., 13500 Philmont Ave., Philadelphia 16, Pa. ....	150	Beckman Instruments, Inc., Scientific & Process Instruments Div., International Div., 2500 Fullerton Rd., Fullerton, Calif. ....	333
*American Optical Co., Instrument Div., Buffalo 15, N. Y. ....	1081	Bel-Art Products, Pequannock, N. J. ....	889
American Plant Equipment Co., P. O. Box 292, Elizabeth, N. J. ....	1282, 1284	Bemis Bro. Bag Co., 604 S. 4 St., Minneapolis 15, Minn. ....	164, 166
American Sterilizer Co., Erie, Pa. ....	366	Biach Industries, Inc., 10 Indian Spring Rd., Cranford, N. J. ....	1253
American Tool & Machine Co., 1415 Hyde Park Ave., Boston, Mass. ....	862	Binder Cooperage Co., Inc., Water & Dickinson Sts., Philadelphia 47, Pa. ....	1127
American Valve Reconditioning Co., 1120 Ohioview Ave., Ambridge, Pa. ....	1406	*Bird Machine Co., South Walpole, Mass. ....	685
American Vulcathene Div. Nalco Co. Inc., 75 Panorama Creek Dr., Rochester 2, N. Y. ....	1201	Bishop & Co. Platinum Works, J., Malvern, Pa. ....	900, 902
Amersil Quartz Div., Engelhard Industries, Inc., 685 Ramsey Ave., Hillside, N. J. ....	192, 196, 225	Black Products Co., 135 St. & Calumet Ave., Chicago 27, Ill. ....	1319
		*Black, Sivalls & Bryson, Inc., 7500 E. 12 St., Kansas City 26, Mo. ....	669

\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

# These Shriver products work for you



One hundred years of service to American industry spotlights these among the many products Shriver has contributed to improved processing and more economical operation.

Pressure filters in several types from small laboratory size to large scale production units for almost every conceivable material from aspirin to alum, salts to sugar, vinegar to viscose . . . continuous thickeners for faster washing, thickening or leaching . . . plastics polymerizers and wax coolers and slabbers . . . filter media of all kinds . . . oxygen-hydrogen generators . . . diaphragm pumps

for difficult fluids. These epitomize the broad range of modern processing units Shriver has perfected to help you in improving production methods.

There's a sheaf of interesting Shriver literature to prove it. Send for the ones you want.

## T. SHRIVER & COMPANY, Inc.

802 HAMILTON STREET • HARRISON, N. J.

Sales representatives in Atlanta, Buffalo, Chicago, Detroit, Houston, Los Angeles, St. Louis, San Francisco, Montreal, Toronto, Mexico City

Be sure to visit the Shriver Exhibit, Booth 473, at the Chemical Exposition, The Coliseum, New York, N. Y.

# Exhibitors

## 27th Exposition of Chemical Industries

	Booth
Blackmer Pump Co., 1809 Century Ave. S. W., Grand Rapids 9, Mich. ....	1129
Blaw-Knox Co., 300 Sixth Ave., Pittsburgh 22, Pa. ....	581
Blickman, Inc., S., 536 Gregory Ave., Weehawken, N. J. ....	325
Bolt and Nut Div. Republic Steel Corp., 1970 Carter Rd., Cleveland 13, Ohio. ....	68
*Bowen Engineering, Inc., North Branch, N. J. ....	706
Bowser, Inc., 1302 E. Creighton Ave., Ft. Wayne 2, Ind. Potter-Bowser Div. ....	396
Process Filters Div. ....	1115
Brabender Corp., Rochelle Park, N. J. ....	37
Brabender Instruments, Inc., C. W., 50 E. Wesley St., So. Hackensack, N. J. ....	340
Bradley Washfountain Co., No. 22 & W. Michigan Sts., Milwaukee 1, Wis. ....	1128, 1130
Bragar Co. Inc., Norman, 1060 Broad St., Newark 2, N. J. ....	1230, 1232
Brailsford & Co., Inc., Milton Point, Rye, N. Y. ....	1411
Bramley Machinery Corp., 880 River Rd., Edgewater, N. J. ....	187
Brinkmann Instruments Inc., 115 Cutter Mill Rd., Great Neck, L. I., N. Y. ....	360
*Brookfield Engineering Laboratories, Inc., 240 Cushing St., Stoughton, Mass. ....	885, 887
Brookhaven Town Industrial Advisory Committee, P. O. 232, Patchogue, N. Y. ....	1410
*Brooks Rotameter Co., P. O. Box 432, Lansdale, Pa. ....	998
*Brown Co., 150 Causeway St., Boston 14, Mass. ....	923
Brown, Judson G., 18 Park Ave., Wakefield, Mass. ....	1093
Browne-Morse Co., Muskegon, Mich. ....	1359
Bryant Mfg. Co., 2020 Montcalm St., Indianapolis, Ind. ....	1089
Bucket Elevator Co., 57 Union Place, Summit, N. J. ....	1038
Buell Engineering Co. Inc., 123 William St., New York 38, N. Y. ....	1204
Buffalo Meter Co. Inc., 2917 Main St., Buffalo 14, N. Y. ....	947
Buffalo Wire Works Co., 320 Terrace, Buffalo 2, N. Y. ....	1381
Buflovak Equipment Div. of Blaw-Knox Co., Buffalo 11, N. Y. ....	581
Burling Instrument Co., 16 River Rd., Chatham, N. J. 9	
Bushman Products Inc., 114 E. 40th St., New York 16, N. Y. ....	1198
Byers Company, A. M., Pittsburgh, Pa. ....	1051

## C

California Pellet Mill Co., 1114 E. Wabash Ave., Crawfordsville, Ind. ....	1360
Cambridge Instrument Co. Inc., Grand Central Terminal, New York 17, N. Y. ....	376
Cameron Iron Works, Inc., P. O. Box 1212, Houston 1, Tex. ....	1062
Carbone Corp., 400 Myrtle Ave., Boonton, N. J. ....	803
Carey Mfg. Co., Philip, Lockland, Cincinnati 15, Ohio ....	1152
Carlisle Gas Burner Corp., Millville, N. J. ....	1251
Carlson Products Corp., P. O. Box 133, Aurora, Ohio. ....	1436
Carpenter Steel Co., Alloy Tube Div., Union, N. J. ....	675
*Carrier Conveyor Corp., 211 N. Jackson St., Louisville 2, Ky. ....	127
Carver, Inc., Fred S., 1 Chatham Rd., Summit, N. J. 90	
Catalytic Combustion Corp., 4725 Fourteenth, Detroit 8, Mich. ....	1209
*Centrico, Inc., 75 W. Forest Ave., Englewood, N. J. ....	842
Centrifix Corp., 3608 Payne Ave., Cleveland 14, Ohio ....	1180
Chain Belt Co., Milwaukee 1, Wis. ....	1416
Chem Flow Corp., 119 Dell Glen Ave., Iodi, N. J. ....	1227
Chemical Abstracts, 430 Park Ave., New York 22, N. Y. ....	86

*Chemical Construction Corp., 525 W. 43 St., New York 36, N. Y. ....	952
Chemical Engineering, 330 West 42nd St., New York 36, N. Y. ....	432 & 481
Chemical Engineering Catalog, 430 Park Ave., New York 22, N. Y. ....	86
Chemical and Engineering News, 430 Park Ave., New York 22, N. Y. ....	86
1155 16 St. N. W., Washington 6, D. C. ....	410
Chemical Engineering Progress, 25 W. 45 St., New York 36, N. Y. ....	1219
Chemical Materials Catalog, 430 Park Ave., New York 22, N. Y. ....	86
Chemical & Pharmaceutical Industry Co., Inc., 90 W. Broadway, New York 7, N. Y. ....	1064
Chemical Plants Div. of Blaw-Knox Co., Pittsburgh 22, Pa. ....	581
Chemical Processing, 111 E. Delaware Place, Chicago 11, Ill. ....	880
Chemical Week, 330 West 42 St., New York 36, N. Y. ....	432 & 481
*Chemicolloid Laboratories, Inc., 55 Herricks Rd., Garden City Park, N. Y. ....	618
*Chemineer, Inc., 1044 East First St., Dayton 2, Ohio. ....	1220
Chemiquip Co., 36 East 10 St., New York 3, N. Y. ....	888
Chemo-Puro Mfg. Corp., 150 Doremus Ave., Newark 5, N. J. ....	962
Chemplast, Inc., 3 Central Ave., E. Newark, N. J. ....	1092
Chempump Div. Fostoria Corp., Buck & County Line Roads, Huntingdon Valley, Pa. ....	659
Cherry-Burrell Corp., Cedar Rapids, Iowa. ....	1039
Chicago Bridge & Iron Co., 332 S. Michigan Ave., Chicago 4, Ill. ....	1045, 1049
*Chiksan Co., Brea, Calif. ....	1268, 1270
Clark-Cooper Co., Palmyra, N. J. ....	1343, 1345, 1347
Cleveland Mixer Co., Cannon at Aurora Roads, Bedford Heights, Cleveland, Ohio. ....	1067, 1069
Cleveland Vibrator Co., 2828 Clinton Ave. W., Cleveland 13, Ohio ....	993, 995
Cleveland Worm & Gear Co., 3249-59 E. 80 St., Cleveland 4, Ohio ....	158
Cobalt Information Center, % Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio. ....	1415
Cog Corp., Div. of Motiograph, Inc., 4441 W. Lake St., Chicago 24, Ill. ....	1388
Coleman Instruments, Inc., 318 Madison St., Maywood, Ill. ....	320
Colonial Plastics Mfg. Co., Industrial Div., 2685 E. 79 St., Cleveland 4, Ohio ....	1283
Colonial Rubber Co., 706 Oakwood St., Ravenna, Ohio. ....	111
Colton Co., Arthur, Div. of Snyder Corp., 3400 E. Lafayette Ave., Detroit 7, Mich. ....	50
*Combustion Engineering, Inc., Raymond Div., 1132 W. Blackhawk St., Chicago 22, Ill. ....	646
*Commercial Filters Corp., 2 Main St., Melrose 76, Mass. ....	223
Conax Corp., 2300 Walden Ave., Buffalo 25, N. Y. ....	1230, 1232
Conneaut Rubber & Plastics Co., Conneaut, Ohio. ....	111
*Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester 3, N. Y. ....	1353
Continental Can Co. Inc., Fibre Drum & Corrugated Box Div., 100 E. 42nd St., New York 17, N. Y. ....	899, 901, 903
*Continental-Emsco Co., Los Angeles, Calif. ....	868
Continental Manufacturing Co., 9216 Floral Ave., Cincinnati 12, Ohio ....	876
Continental Oil Co., Petrochemical Dept., 1270 Avenue of the Americas, New York 20, N. Y. ....	930
*Cooper Alloy Corp., Bloy St. & Ramsey Ave., Hillside, N. J. ....	103
Corley Co., Inc., 685 Myrtle Ave., Boonton, N. J. ....	1116
Cornell Machine Co., 99 Wall St., New York 5, N. Y. ....	1212
*Corning Glass Works, Corning, N. Y. ....	134
Coulter Industrial Sales Co., P. O. Box 22, Elmhurst, Ill. ....	1444
*Crane Co., 836 S. Michigan Ave., Chicago 5, Ill. ....	422
*Crane Packing Co., 6400 Oakton St., Morton Grove, Ill. ....	908
Crawford Fitting Co., 884 E. 140 St., Cleveland 10, Ohio ....	987, 989

\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.



CONTINENTAL-EMSCO

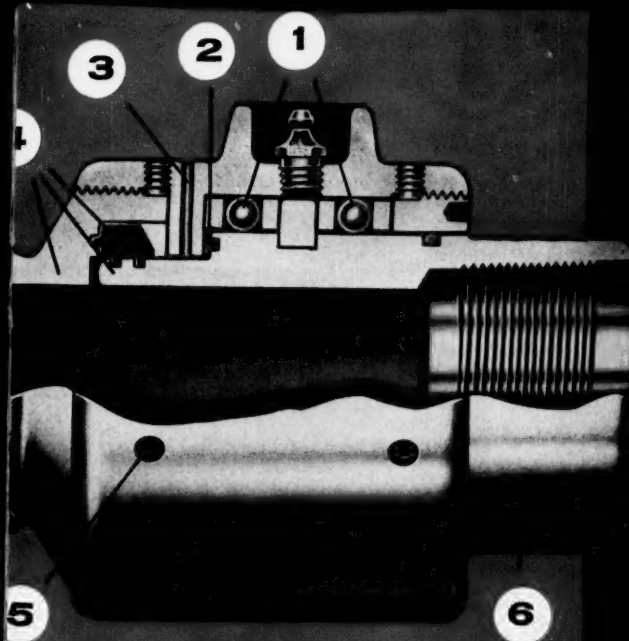
# US TYPE SWIVEL JOINTS

*..handle corrosive  
chemicals*

*..stop grease contam-  
ination of fluids*

*..are repaired on location  
with simple tools*

*..can be welded  
into the line*



1. Wide Bearing Spacing .. No Split Races
2. Secondary Seal
3. "Weep Hole"
4. Only Wettable Parts and Packing Contact Fluid
5. Simple Set Screws Allow Joint to Break Like a Union .. Bearings and Other Parts Not Disturbed
6. Scarfed Ends for Welding Available

See Continental-Emsco US Type Swivel Joints .. Booth 868  
at The Twenty-Seventh Exposition Chemical Industries

Continental-Emsco US Type swivel joints are designed *exclusively* for the chemical industry. Fluid contacts metal and packing only, so wettable parts of corrosion resisting stainless steel (or other alloys) can handle all types of caustic products. Primary Teflon packing, *deformed* into grooves for a tight seal, and a secondary asbestos seal prevent grease from contaminating products. Packing chamber design is patented. It reduces bearing wear by preventing packing from pressing against bearings, and allows free swiveling regardless of internal pressure. Joints break like a union without unseating ball bearings and other parts. Joint can be welded into the line,

eliminating costly flanges. Threaded and flanged ends are also available. Wide bearing spacing through use of solid bearing races insures accurate alignment and provides maximum bearing support for internal and external loadings. Races are separate and can be reversed to double their life. Repairs and adjustments are made on the spot, without special tools .. shop or factory equipment not required.

Save installation and maintenance costs by designing, building or replacing with Continental-Emsco swivel joints. There's a size and type to meet all your product handling problems. Let us bid on your next requirement.

**New Swivel Joint Catalog Now  
Available .. Write for it Today.**

CONTINENTAL-EMSCO COMPANY • P. O. Box 359 • Dallas 21, Texas

Gentlemen: Please send me your current Swivel Joint Catalog. We are planning:  
( ) New installation ( ) Replacement ( ) Catalog File

NAME

TITLE

COMPANY

CITY

ZONE

STATE

PLEASE PRINT



**CONTINENTAL-EMSCO**

*Industrial Products Division*

P. O. Box 359, DALLAS 21, TEXAS

Division of The Youngstown Sheet and Tube Company

# Exhibitors

## 27th Exposition of Chemical Industries

### Booth

Crawford & Russell Inc., 695 Summer St., Stamford, Conn. ....	1000
Croll-Reynolds Co., Inc., 751 Central Ave., Westfield, N. J. ....	1054
Croll-Reynolds Engineering Co., Inc., 17 John St., New York 38, N. Y. ....	1054
*Crossley Machine Co., 301 Monmouth St., Trenton 9, N. J. ....	1423, 1425
Crucible Steel Co. of America, Titanium Div., P. O. Box 2518, Pittsburgh 30, Pa. ....	1424, 1426, 1428
Curtiss-Wright Corp., Metals Processing Div., P. O. Box 13, Buffalo 15, N. Y. ....	1344, 1346

### D

*Daffin Mfg. Co., Lancaster, Pa. ....	1400, 1404
*Davenport Machine and Foundry Co., 1628-66 West Fourth St., Davenport, Iowa. ....	818
Day Co., 810 Third Ave. N. E., Minneapolis 13, Minn. ....	45
*Day Co., J. H. Div., Cleveland Automatic Machine Co., 4932 Beech St., Norwood, Cincinnati 12, Ohio. ....	121, 122
*Dean Brothers Pumps, Inc., 323 West 10th St., Indianapolis 7, Ind. ....	1245, 1247, 1249
Dean Panel Coil Div., Dean Products, Inc., 616 Franklin Ave., Brooklyn 38, N. Y. ....	184
DeBothezat Fans Div. American Machine and Metals, Inc., E. Moline, Ill. ....	556
Dekorons Products Div., Samuel Moore & Co., Mantua, Ohio. ....	1182, 1184
*DeLaval Separator Co., Poughkeepsie, N. Y. ....	94
Delavan Mfg. Co., Grand Ave. & Fourth St., W. Des Moines, Iowa. ....	1354, 1356
Delaware Barrel & Drum Co., Inc., P. O. Box 1648, Wilmington 99, Dela. ....	1187, 1189, 1193
Denver Equipment Co., 1400 17th St., P. O. Box 5268, Denver 17, Colo. ....	1146
Derrick Manufacturing Co., 590 Duke Rd., Buffalo 25, N. Y. ....	811
*Devine Mfg. Co., J. P., 49th St. & A.V.R.R., Pittsburgh 1, Pa. ....	1372
*DeZurik Corp., Sartell, Minn. ....	907
Dicalite Dept., Mining & Mineral Products Div., Great Lakes Carbon Corp., 612 S. Flower St., Los Angeles 17, Calif. ....	204
Distillation Engineering Co., 105 Dorsa Ave., Livingston, N. J. ....	1048
Doré Company, John L., 5406 Schuyler St., P. O. Box 7772, Houston 7, Texas. ....	1295, 1297
*Dorr-Oliver, Inc., Barry Place, Stamford, Conn. ....	531
Downingtown Iron Works Div., Pressed Steel Tank Co., Downingtown, Pa. ....	631
*Dracco Division of Fuller Co., Cleveland, Ohio. ....	495
Drayer Hanson Div., National-U.S. Radiator Corp., P.O. 2215 Terminal Annex, Los Angeles 54, Calif. ....	850
*Ducon Co., Inc., 147 East Second St., Mineola, L. I., N. Y. ....	990, 992
*Duralab Equipment Corp., 979-995 Linwood St., Brooklyn 8, N. Y. ....	359
*Durametall Corp., 2104 Factory St., Kalamazoo, Mich. ....	1216
*Duriron Co., Inc., 450 No. Findlay, Dayton 4, Ohio. ....	520 & 532
Dustex Corp., 25 Anderson Road, Buffalo 25, N. Y. ....	1299
	1301
*du Verre, Inc., 374 Delaware Ave., Buffalo 2, N. Y. ....	891

### E

Eagle-Picher Co., Insulation Div., American Bldg., Cincinnati 1, Ohio. ....	1167, 1169
*Eastern Industries Inc., 100 Skiff St., Hamden 14, Conn. ....	1275
Eastman Kodak Co., 343 State St., Rochester 4, N. Y. ....	838

### Booth

*Eaton-Dikeman Co., Filbertown, Mount Holly Springs, Pa. ....	1120
*Eclipse Fuel Engineering Co., 1100 Buchanan St., Rockford, Ill. ....	973
*Eco Engineering Co., Div. of Economy Faucet Co. Inc., 12 New York Ave., Newark 1, N. J. ....	978
Edison Industries, Thomas A., Instrument Div. McGraw-Edison Co., W. Orange, N. J. ....	945
Eiche & Associates Inc., R. J., 10 Columbus Circle, New York 19, N. Y. ....	868, 1236
*Eimco Corp., 634-666 So. Fourth West St., Salt Lake City 10, Utah. ....	80, 81
Electric Hotpack Co., Inc., Cottman Ave. at Melrose St., Philadelphia 35, Pa. ....	373, 375
Electrode Div., Great Lakes Carbon Corp., 18 East 48th St., New York 17, N. Y. ....	204
Engelhard Chemical Div., Engelhard Industries, Inc., 113 Astor St., Newark 2, N. J. ....	192, 196, 225
Engelhard Industries, Inc., 113 Astor St., Newark 2, N. J. ....	192, 196, 225
*Enjay Company Inc., 15 West 51 St., New York 19, N. Y. ....	944, 946, 948
Entoleter Div. of Safety Industries, Inc., P.O. Box 904, New Haven, Conn. ....	645
*Eriez Mfg. Co., 1945 Grove Dr., Erie, Pa. ....	909, 911
Ertel Engineering Corp., 8-14 N. Front St., Kingston 20, N. Y. ....	623
Ethylene Chemical Corp., 245 Broad St., Summit, N. J. ....	971
Ever-Tite Coupling Co., 254 West 54th St., New York 19, N. Y. ....	1159
Exact Weight Scale Co., 538 E. Town St., Columbus 15, Ohio. ....	21

### F

*Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill. ....	1323, 1325, 1327
Falcon Alarm Co., 243 Broad St., Summit, N. J. ....	1343
	1345, 1347, 1349
Falls Industries, Inc., Aurora Road, Solon, Ohio. ....	131
*Fansteel Metallurgical Corp., North Chicago, Ill. ....	617
*Farval Corp., 3249-59 E. 80th St., Cleveland 4, Ohio. ....	158
Fenwal Inc., Ashland, Mass. ....	890, 892
Ferranti Electric Inc., 95 Madison Ave., Hempstead, L. I., N. Y. ....	1144
Fibercast Co., A Div. of Youngstown Sheet & Tube Co., P. O. 727, Sand Springs, Okla. ....	870
Fike Metal Products Corp., 704 South 10th St., Blue Springs, Mo. ....	1427
Filterite Corp., Green Spring Dr., Timonium, Md. ....	1303
Filtration Engineers Div., American Machine and Metals, Inc., E. Moline, Ill. ....	456
Filtration Fabrics Div., American Machine and Metals, Inc., E. Moline, Ill. ....	556
Filtros Inc., 601 W. Commercial St., E. Rochester, N. Y. ....	854, 856
Fischbein Co., Dave, 2720 30th Ave. South, Minneapolis 6, Minn. ....	872
Fischer & Porter Co., Hatboro, Pa. ....	496
Fitzpatrick Corp., Div. of the W. J. Fitzpatrick Co., 1001 W. Washington Blvd., Chicago 7, Ill. ....	64
Fitzpatrick Co., W. J., 1001 W. Washington Blvd., Chicago 7, Ill. ....	64
Flanders Filters Inc., P. O. Box 718, Riverhead, N. Y. ....	937
*Fletcher Div., Sharples Corp., 2300 Westmoreland Ave., Philadelphia 40, Pa. ....	459
Florida Development Commission, Carlton Bldg., East Wing, Tallahassee, Fla. ....	1037, 1050
Flow-Actuated Control Co., 101 W. Palisade Ave., Englewood, N. J. ....	1343, 1345, 1347, 1349
Flowline Corp., New Castle, Pa. ....	805
*Fluid Energy Processing & Equipment Co., Richmond & Norris Sts., Philadelphia 25, Pa. ....	813
Food Machinery and Chemical Corp., Peerless Pump Div., 301 West Ave. Twenty-Six, Los Angeles 31, Calif. ....	831
Food Processing, 111 E. Delaware Place, Chicago 11, Ill. ....	880
*Foxboro Co., Foxboro, Mass. ....	519
Frank Chemical Co., Inc., J. P., 5410 Avenue U, Brooklyn 34, N. Y. ....	921

\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

# Spray drying NEWS



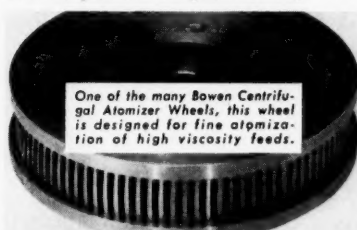
RECOGNIZED  
LEADER  
IN SPRAY  
DRYING  
SINCE 1926

## Bowen Centrifugal Spray Machine built to stand punishment of 'round-the-clock production

**DESIGN AND CONSTRUCTION  
FEATURES ASSURE DEPENDABLE  
OPERATION WITH  
MINIMUM ATTENTION**

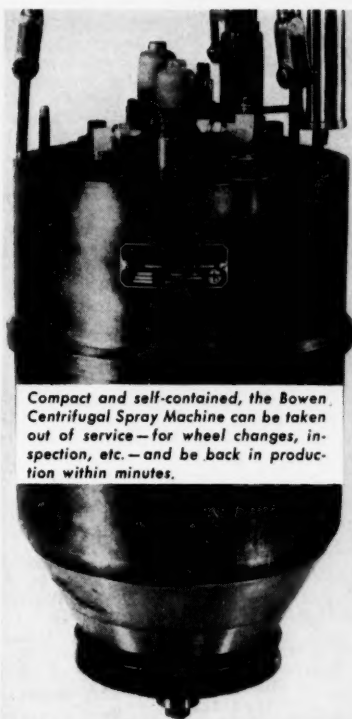
Long acclaimed by the process industries as the most sturdy and dependable drive mechanism for centrifugal atomization, the Bowen Centrifugal Spray Machine is ideally suited for spray drying chemical products under automatically-controlled, high-tonnage production conditions.

**EXCEPTIONAL OPERATING FLEXIBILITY**—Whether solutions, slurries or emulsions are being spray dried, the Bowen Spray Machine enables purchasers of Bowen Spray Dryers to capitalize fully on the inherent benefits of the centrifugal atomizing technique. For example: (1) Feed rates—hence, production rates—may be adjusted over a broad operating range with no perceptible change in finished product characteristics. (2) Product particle size may be altered easily by changing spray machine speed. (3) In addition, other product characteristics—such as bulk density and particle size distribution—may be varied to suit requirements by means of interchangeable Bowen Atomizer Wheels of different patented designs. (see cut)



One of the many Bowen Centrifugal Atomizer Wheels, this wheel is designed for fine atomization of high viscosity feeds.

**SIMPLE DIRECT-DRIVE DESIGN**—Unique, yet simple in design, the Bowen Spray Machine is a compact, self-contained unit constructed for continuous high-temperature operation. Its built-in high frequency motor is protected by a sturdy water-jacketed housing through which a corrosion-resistant feed pipe delivers feed material to a rapidly spinning atomizer wheel. This centrifugal wheel is directly



Compact and self-contained, the Bowen Centrifugal Spray Machine can be taken out of service—for wheel changes, inspection, etc.—and be back in production within minutes.

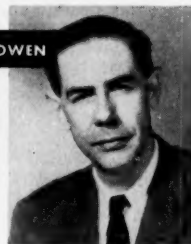
mounted on the short, rugged main drive shaft of the motor to assure positive, efficient operation. A frequency converter set (which may be safely located out of hot, dusty and otherwise hazardous process areas) furnishes the high frequency current needed for machine operation. Frequencies can be precisely selected to provide any desired atomizer wheel speed between 4,000 rpm and 20,000 rpm.

**MINIMUM ATTENTION REQUIRED**—Automatic control of a constant feed rate is easily accomplished since feed introduction depends on simple gravity flow or easily-maintained low pressures. There are no pump-pressure fluctuations to cause operating headaches. This—coupled with the steady, unwavering speed of the high-frequency motor driven centrifugal wheel—guarantees day-in and day-out production of uniform product with minimum operator attention. And unlike centrifugal machines employing standard-speed motors, the Bowen machine has no complicated high-speed belt or gear system that invariably introduces complex, time-consuming problems of balancing, alignment, shaft distortion and excessive wear. The simple Bowen direct-drive design avoids these troublesome, production-halting problems and eliminates the need for frequent machine maintenance and repair.

For more information on the Bowen Spray Machine, request Bulletin No. 51.

### SPEAKING FOR BOWEN

**DONALD W. BELCHER,**  
Bowen V. P. in charge  
of Engineering,  
discusses three methods  
of atomization used in  
various Bowen spray  
dryer designs.



### ATOMIZATION TECHNIQUES

Atomization is the heart of the spray drying process. It is the means by which high liquid surface-to-mass ratios are attained for achieving the extremely rapid rates of evaporation essential to an efficient spray drying operation. Three methods are commonly employed:

**PRESSURE NOZZLE ATOMIZATION**—Here, atomization energy is provided by fluid pressure. Liquid feed material is introduced to the spray dryer under high pressures through specially-designed nozzles. This method is restricted to solutions and uniform, fine-particle slurries. To a limited degree, variations in product characteristics may be obtained by changing nozzle designs and operating pressures.

**CENTRIFUGAL ATOMIZATION**—This method utilizes the energy of centrifugal force to atomize the feed material. Any solution or slurry that can be pumped can be handled by this method. A rapidly spinning wheel accelerates the feed into a thin sheet that leaves the wheel edge at speeds ranging from 150 to 450 mph. The tearing impact of the feed against the drying air atomizes both low and high viscosity materials into a fog-like mist. The centrifugal technique and its advantages are described further in the adjoining article.

**PNEUMATIC NOZZLE ATOMIZATION**—Sometimes called two-fluid nozzle atomization, this method obtains its energy for feed atomization from the pressure of a second fluid, usually air or steam. It is particularly well suited for handling abrasive feeds provided the nozzle is properly designed. Generally, this method is limited to low production capacity operations.

Check items desired, clip and mail with your name, title and company address to Bowen Engineering, Inc., North Branch 21, N. J.

- ☐ Bowen Spray Machine Bulletin No. 51
- ☐ Bowen Test Laboratory Booklet

Information on the feasibility of spray drying:

**BOWEN ENGINEERING, INC.**  
North Branch 21, N. J.

See Us At The CHEM SHOW  
Main Exhibit Floor — Booth No. 706

# Exhibitors

## 27th Exposition of Chemical Industries

	Booth
Freezing Equipment Sales Inc., York, Pa.	446
*Frick Co., Waynesboro, Pa.	1258, 1260
*Fuller Co., Catasauqua, Pa.	446
*Fulton Siphon Div., Robertshaw-Fulton Controls Co., P. O. Box 400, Knoxville 1, Tenn.	1293

## G

Gabb Special Products, Inc., Windsor Locks, Conn.	1106
Galigher Co., 545-585 W. 8th South St., P. O. Box 209, Salt Lake City, Utah	843
*Garlock Packing Co., Palmyra, N. Y.	415
Gems Co., Sheppard Lane, Farmington, Conn.	1343
	1345, 1347, 1349
General Alloys Co., 367-405 West First St., Boston 27, Mass.	193
*General American Transportation Corp., 135 S. La-Salle St., Chicago 3, Ill.	435, 436, 442, 446, 495
General Ceramics Co., A Division of Indiana General Corp., Keasbey, N. J.	131
General Dispersions, Inc., 165 Third Ave. at E. 26 St., Paterson, N. J.	967
General Electric Co., Apparatus Sales Div., 1 River Rd., Schenectady 5, N. Y.	482
General Kinetics Corp., 197 South Van Brunt St., Englewood, N. J.	1370
General Laboratory Supply Co., P. O. Box 2607, Paterson, N. J.	310
General Plastics Corp., 165 Third Ave. at E. 26 St., Paterson, N. J.	967
Gifford-Wood Co., Hudson, N. Y.	219
Glascote Products, Inc., Subsidiary of A. O. Smith Corp., 20900 St. Clair Ave., Cleveland 17, Ohio	596
Glenarry Processes, Inc., Bay Shore, N. Y.	60
Goodyear Pumps Inc., 9 Rockefeller Plaza, New York 20, N. Y.	1341
*Goulds Pumps, Inc., Seneca Falls, N. Y.	1288, 1290, 1292, 1294
Gow-Mac Instrument Co., 100 Kings Rd., Madison, N. J.	1246
*Graham Transmissions Inc., Menomonee Falls, Wis.	1053, 1066
Gray Tool Co., Houston, Tex.	1342, 1363
Great Lakes Carbon Corp., Mining & Mineral Products Div., 612 S. Flower St., Los Angeles 17, Calif.	204
Great Western Mfg. Co., Leavenworth, Kansas	216
Greif Bros. Cooperage Corp., P. O. Box 398, Lindenhurst, L. I., N. Y.	41
*Grinnell Co., Inc., 260 W. Exchange St., Providence 1, R. I.	566
Gulf Publishing Co., P. O. Box 2608, Houston 1, Tex.	1035
Gump Co., B. F., 1325 S. Cicero Ave., Chicago 50, Ill.	1024, 1026

## H

Hamer Valves, Inc., 2919 Gardenia Ave., Long Beach, Calif.	1236
Hamilton Kettles, Cincinnati, Ohio	623
Hanovia Lamp Div., Engelhard Industries, Inc., 100 Chestnut St., Newark 5, N. J.	192, 196, 225
Hapman Conveyors, Inc., 630 Gibson St., Kalamazoo 6, Mich.	1358
Harbison-Walker Refractories Co., 307 Fifth Ave., Pittsburgh 22, Pa.	1241, 1243
*Hardinge Co., Inc., 240 Arch St., P. O. Box 312, York, Pa.	582
Hardinge Mfg. Co., 240 Arch St., P. O. Box 312, York, Pa.	582
Harman Associates, F. Ward, Div. Marine Model Co. Inc., Halesite, L. I., N. Y.	994
Harper Co., H. M., Morton Grove, Ill.	1032, 1034
Hastings-Raydist Inc., Hampton, Va.	1020

\* For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

## Booth

*Haveg Industries, Inc., 900 Greenbank Rd., Wilmington 8, Del.	546
*Haynes Stellite Co., Div. of Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.	460, 470
Heat Transfer Div., National-U. S. Radiator Corp., 342 Madison Ave., New York 17, N. Y.	850
Heil Process Equipment Corp., 12901 Elmwood Ave., Cleveland 11, Ohio	1305
Hercules Filter Corp., 175 Ethel Ave., Hawthorne, N. J.	213
*Hercules Powder Co., Wilmington 99, Del.	916
Hetherington & Berner Inc., 701-745 Kentucky Ave., Indianapolis 7, Ind.	1100
High Pressure Equipment Co., Inc., 1222 Linden Ave., Erie, Pa.	1215, 1217
*Hills-McCanna Co., 4600 W. Touhy Ave., Chicago 30, Ill.	1173-1176
Hobam, Inc., 1720 Military Rd., Buffalo 17, N. Y.	1262, 1264
Hockmeyer & Co., Herman, 341 Coster St., Bronx 59, N. Y.	1178
*Hoke Inc., 1 Tenakill Pk., Cresskill, N. J.	201
Hormann & Co., Inc., F. R., 17 Stone St., Newark 4, N. J.	977
Hospital Supply Co. Inc., 114 East 25th St., New York 10, N. Y.	975
Howe Scale Co., Subsidiary of Safety Industries, Inc., Rutland, Vt.	645
Howes Co. Inc., S. Silver Creek, N. Y.	1029
Hungerford & Terry, Inc., Clayton, N. J.	1164, 1166
Hunt Machine Co., Rodney, Mill St., Orange, Mass.	1240, 1242, 1244
Hydril Co., 714 W. Olympic Blvd., Los Angeles 15, Calif.	1104

## I

*I-T-E Circuit Breaker Co., 1900 Hamilton St., Philadelphia 30, Pa.	25
*Illinois Water Treatment Co., 840 Cedar St., Rockford, Ill.	864
Imperial Brass Mfg. Co., 6300 W. Howard St., Chicago 31, Ill.	894, 896
Industrial Chemical Sales Div., West Virginia Pulp and Paper Co., 230 Park Ave., New York 17, N. Y.	924, 926
Industrial Div., Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44, Pa.	635
Industrial and Engineering Chemistry	
430 Park Ave., New York 22, N. Y.	86
1155 16 St., N. W., Washington 6, D. C.	410
*Industrial Filter & Pump Mfg. Co., 5900 Ogden Ave., P. O. Box 151, Cicero, Ill.	1188 & 1202
Industrial Nucleonics Corp., 650 Ackerman Rd., Columbus 14, Ohio	1418, 1420
Industrial Plastic Fabricators Inc., Endicott St., Norwood, Mass.	1102
Industrial Products Engineering Co., 26-40 Jackson Ave., Long Island City 1, N. Y.	1259
*Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y.	128
Instruments and Systems Div., Engelhard Industries, Inc., 850 Passaic Ave., E. Newark, N. J.	192, 196, 225
International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.	509
International Process Equipment Co., Inc., 1145 Bolander Ave., Dayton 8, O.	812
Ionics, Inc., 152 Sixth St., Cambridge 42, Mass.	1137

## J

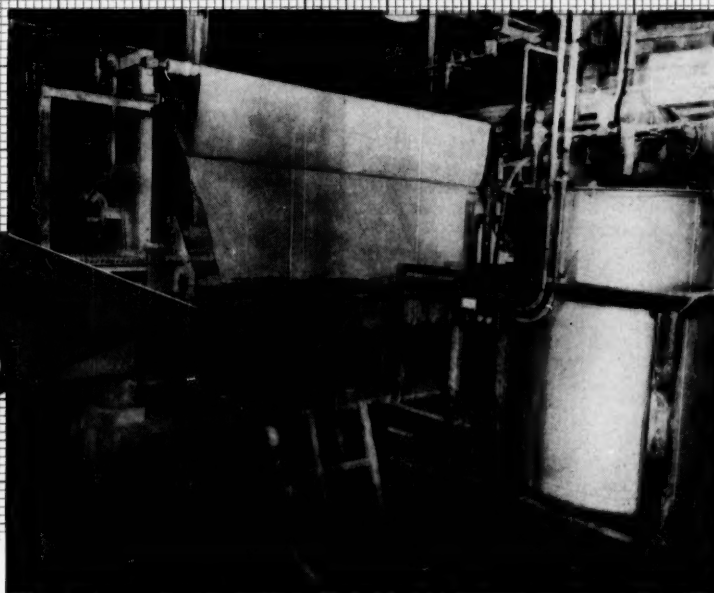
Jabsco Pump Co., 1485 Dale Way, Costa Mesa, Calif.	1016, 1018
Jacoby-Tarbox Corp., 808 Nepperhan Ave., Yonkers, N. Y.	1362
*Jamesbury Corp., 45 New St., Worcester, Mass.	1068, 1070
Jarco Services, Inc., 415 So. Kenosha, Tulsa 20, Okla.	1343, 1345, 1347, 1349
*Jeffrey Mfg. Co., Columbus 16, Ohio	97
*Jenkins Bros., 100 Park Ave., New York 17, N. Y.	409



# GET FILTRATION RESULTS LIKE THIS.....



FILTER  
PRODUCTION INCREASED  
BY **170%**



Illustrated, Komline-Sanderson string discharge filter with compression wash blanket mechanism at Reichard-Coulston Inc., Bethlehem, Penna.

SEE THE  
KOMLINE-SANDERSON  
FILTER EXHIBIT AT THE  
CHEMICAL INDUSTRIES  
EXPOSITION,  
NEW YORK COLISEUM  
NOV. 30 - DEC. 4, 1959,  
BOOTHS 1307-1309.

Komline-Sanderson engineers will be glad to show you how superior filter equipment can increase your production and improve your product. A complete custom filter service is available, including laboratory testing and evaluation of slurries, pilot plant scale tests, recommendation of equipment for the complete filter station, custom designed equipment manufactured to specification, start-up supervision.

INDUSTRIAL FILTER DIVISION  
**KOMLINE-SANDERSON  
ENGINEERING CORPORATION**  
PEAPACK, NEW JERSEY  
ARLINGTON HEIGHTS, ILLINOIS  
BRAMPTON, ONTARIO, CANADA

REPRESENTATIVES IN PRINCIPAL CITIES

STRING DISCHARGE  
SCRAPER DISCHARGE  
ROLL DISCHARGE  
PRECOAT  
HORIZONTAL  
LABORATORY TYPE  
PILOT PLANT TYPE

Write for Bulletin No. KSI-3

# Exhibitors

## 27th Exposition of Chemical Industries

	Booth
*Jerguson Gage & Valve Co., Adams St., Burlington, Mass. ....	1211, 1213
*Johns-Manville Sales Corp., 22 East 40th St., New York 16, N. Y. ....	172, 176
Journal of Agricultural and Food Chemistry 450 Park Ave., New York 22, N. Y. ....	86
1155 16 St. N. W., Washington 6, D. C. ....	410
<b>K</b>	
Kanigen Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Keasbey & Mattison Co., Ambler, Pa. ....	822
*Kennedy Van Saun Mfg. & Engineering Corp., 405 Park Ave., New York 22, N. Y. ....	1036
Kewaunee Mfg. Co., Adrian, Mich. ....	398
Kimble Glass Co., Subsidiary of Owens-Illinois, Toledo 1, Ohio ....	390
Knapp Mills, Inc., 23-15 Borden Ave., Long Island City 1, N. Y. ....	175
Knight, Maurice A., P. O. Box 111, Akron 9, Ohio ....	586
*Komline-Sanderson Engineering Corp., Peapack, N. J. ....	1307, 1309
Koven Fabricators, Inc., 90 E. Dickerson St., Dover, N. J. ....	74
<b>L</b>	
LKB Instruments, Inc., 12704 Littleton St., Silver Spring, Md. ....	1422
Laboratory Equipment Corp., P. O. Box 151, St. Joseph, Mich. ....	905
Laboratory Furniture Co. Inc., Old Country Rd., P. O. Box 590, Mineola, L. I., N. Y. ....	309
Laboratory Glass & Instruments Corp., 514 West 147 St., New York 31, N. Y. ....	369
*La Bour Co., Inc., Elkhart, Ind. ....	42
Ladish Co., Cudahy, Wis. ....	63
Ladish Co., Tri-Clover Div., Kenosha, Wis. ....	63
*Lapp Insulator Co., Inc., Process Equipment Div., LeRoy, N. Y. ....	696
Lawrence Pumps Inc., 371 Market St., Lawrence, Mass. ....	852
Lead Industries Assn., 60 East 42nd St., New York 17, N. Y. ....	816
Lead Lined Iron Pipe Co., Wakefield, Mass. ....	70
Lebanon Steel Foundry, Lebanon, Pa. ....	20
Lee Metal Products Co., Inc., Philipsburg, Pa. ....	1384
Lehigh Fan & Blower Div., Fuller Co., Catasauqua, Pa. ....	446
Lehmann Co., Inc., J. M., 550 New York Ave., Lyndhurst, N. J. ....	1429, 1431, 1446
Leitz, Inc., E. Scientific Instrument Div., 468 Fourth Ave., New York 16, N. Y. ....	1383
Leslie Co., Lyndhurst, N. J. ....	1333
*Link-Belt Co., Prudential Plaza, Chicago 1, Ill. ....	165
Logan Emergency Showers, Inc., P. O. Box 111, Glendale, Calif. ....	883
Louisville Dryer Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Lunkenheimer Co., Cincinnati 14, Ohio. ....	1380, 1382
<b>M</b>	
McFarland Engineering & Pump Co., Houston, Tex. ....	1342, 1363
*McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. ....	974
McGraw-Hill Publishing Co., 330 West 42nd St., New York 36, N. Y. ....	432 & 481
McIntosh Equipment Corp., 15 Park Row, New York 38, N. Y. ....	1343, 1345, 1347, 1349

\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

M-H Standard Corp., 513-521 Communipaw Ave., Jersey City 4, N. J. ....	997
*Magnetrol, Inc., 2110 S. Marshall Blvd., Chicago 23, Ill. ....	910, 912
Mallory-Sharon Metals Corp., Niles, O. ....	1133, 1135
*Manton-Gaulin Mfg. Co., Inc., 44 Garden St., Everett 49, Mass. ....	51
*Marindus Co., Inc., 51 Pine St., New York 5, N. Y. ....	1440
Martin Engineering Co., Neponset, Ill. ....	1118
Master Electric Co., Div. of Reliance Electric & Engineering Co., 126 Davis Ave., Dayton 1, Ohio. ....	10
Mazzoni G. S.p.A., Viale Trentino 10/12, Casella Postale N. 375, Busto Arsizio, (Varese), Italy. ....	1412
Meccaniche Moderne, Busto Arsizio (Italia) ....	1429
	1431, 1446
Melrath Canned Pumps, Inc., Tioga St. & Aramingo Ave., Philadelphia 34, Pa. ....	1351
*Metal-Cladding, Inc., P. O. Box 544, North Tonawanda, N. Y. ....	1378
Metal Glass Products Co., Belding, Mich. ....	623
*Metal Hydrides Inc., 12-24 Congress St., Beverly, Mass. ....	964
Metalab Equipment Co., Div. of Norbute Corp., 270 Duffy Ave., Hicksville, L. I., N. Y. ....	356
*Metals & Controls Corp., General Plate Div., 34 Forest St., Attleboro, Mass. ....	1094
Metalsalts Corp., 200 Wagaraw Rd., Hawthorne, N. J. ....	933
Mettler Instrument Corp., Box 242, Hightstown, N. J. ....	339
Michigan Chemical Corp., 500 N. Bankson St., St. Louis, Mich. ....	942
Micro Metallic Div., Pall Corp., 30 Sea Cliff Ave., Glen Cove, N. Y. ....	1012, 1014
Miller & Son, Inc., Franklin P., Supreme Div., 36 Meadow St., E. Orange 38, N. J. ....	1010
Miller Products Co., Inc., 29 Warren St., New York 7, N. Y. ....	1091
Milton Roy Co., 1300 E. Mermaid Lane, Philadelphia 18, Pa. ....	610
Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 9, Pa. ....	14, 16
Minerals & Chemicals Corp. of America, Menlo Park, N. J. ....	950
*Minneapolis-Honeywell Regulator Co., Industrial Div., Wayne & Windrim Aves., Philadelphia 44, Pa. ....	635
Mission Mfg. Co., P. O. Box 4209, Houston 14, Tex. ....	1417, 1419
Mixing Equipment Co., Inc., 135 Mt. Read Blvd., Rochester 11, N. Y. ....	146
Monarch Mfg. Works, Inc., 2501 E. Ontario St., Philadelphia 34, Pa. ....	881
Monsanto Chemical Co., St. Louis 4, Mo. ....	922
Moore & Co., Samuel, Dekoron Products Div., Mantua, Ohio ....	1182, 1184
*Morehouse-Cowles, Inc., 1156 San Fernando Rd., Los Angeles 65, Calif. ....	814
*Multi-Metal Wire Cloth Co., Inc., 1350 Garrison Ave., New York 59, N. Y. ....	191

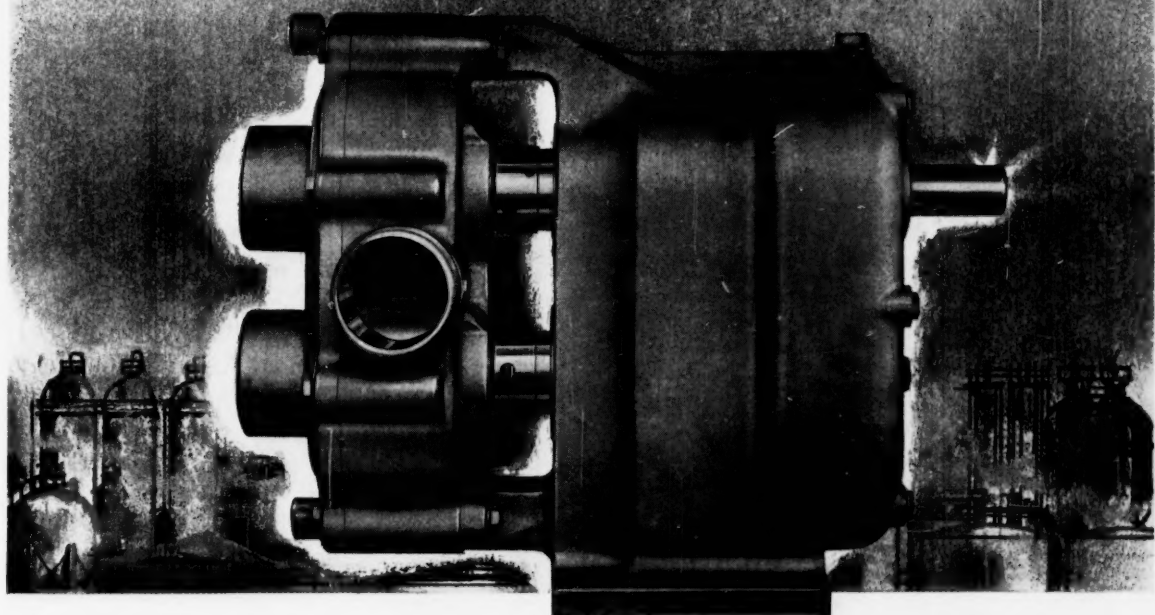
## N

Nalge Co., Inc., 75 Panorama Creek Dr., Rochester 2, N. Y. ....	1201
Namco Machinery Inc., 54 Kosciusko St., Brooklyn 5, N. Y. ....	365
*Nash Engineering Co., South Norwalk, Conn. ....	238
*National Carbon Co., Div. of Union Carbide Corp., 30 East 42nd St., New York 17, N. Y. ....	460, 470
National Drying Machinery Co., Lehigh Ave. & Hancock St., Philadelphia 33, Pa. ....	1112, 1114
National Dust Collector Corp., 549 W. Washington Blvd., Chicago 6, Ill. ....	695
*National Engineering Co., 549 W. Washington Blvd., Chicago 6, Ill. ....	695
*National Filter Media Corp., 1717 Dixwell Ave., New Haven 14, Conn. ....	1113
National Lead Co., Titanium Alloy Mfg. Div., 111 Broadway, New York 6, N. Y. ....	234
National Rosin Oil Products, Inc., Savannah, Ga. ....	917
National Tube Div., United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa. ....	590

**NEW.**

**... corrosion - resistant positive displacement chemical pump**

**WAUKESHA**



**slow speed... heavy duty... longer life...**

**ENGINEERING  
SERVICE**

Waukesha offers a competent staff of engineers to aid you in your pumping problems. Representatives in all major cities, territorial managers, and direct factory representatives.

**Write for Catalog P302**



This "Waukesha" has been specifically designed for the chemical industry . . . to handle without turbulence, pulsation, aeration or agitation, corrosive-problem liquids of high or low viscosity. It has been engineered by the world's largest producers of stainless steel positive displacement pumps. This new "Waukesha" has completed more than 2 years of rugged field tests . . . promises the chemical industry years of dependable service.

**No other chemical positive displacement pump incorporates so many outstanding features**

- Low speed . . . heavy duty . . . long life.
- Helical timing gears for smooth operation.
- Twin-balanced impellers.
- Single or dual mechanical seals (John Crane). Also available with packing gland construction and pressurized sealing.
- Self-priming.
- Thrust bearing controls shaft deflection.
- Iron pipe or flange type connection.
- Off shelf replacements.
- Quick disassembly of pumping head.
- 500 R.P.M. maximum speed — 200 lbs. P.S.I.

**WAUKESHA FOUNDRY COMPANY Dept. 101, Waukesha, Wisconsin**

*positive displacement pumps... centrifugal pumps... stainless steel fittings... corrosion resistant castings*

# Exhibitors

## 27th Exposition of Chemical Industries

### Booth

National-U. S. Radiator Corp., Johnstown, Pa. ....	850
Drayer Hanson Div., P.O. Box 2215 Terminal Annex, Los Angeles 54, Calif. ....	
Heat Transfer Div., 342 Madison Ave., New York 17, N. Y. ....	
North-Erie and American Process Equipment Div., P.O. Box 231, Middletown, Pa. ....	
Plastic Metals Div., 342 Madison Ave., New York 17, N. Y. ....	
Nero-Products Dept., Great Lakes Carbon Corp., 333 No. Michigan Ave., Chicago 1, Ill. ....	204
*Nettco Corp., Everett, Mass. ....	79
New Brunswick Scientific Co., P.O. Box 606, New Brunswick, N. J. ....	324
New York Laboratory Supply Co. Inc., 76 Varick St., New York 13, N. Y. ....	1022
Newark Wire Cloth Co., 351 Verona Ave., Newark 4, N. J. ....	183
Niagara Blower Co., 405 Lexington Ave., New York 17, N. Y. ....	655
Niagara Filters Div., American Machine and Metals, Inc., E. Moline, Ill. ....	506
*Nichols Engineering & Research Corp., Nerco-Niro Spray Dryer Div., 70 Pine St., New York 5, N. Y. ....	624
Norcross Corp., 247 Newtonville Ave., Newton 58, Mass. ....	443
Norcross Companies, Sterling E., Kem-Feed Div., 19 Osborne St., Bloomfield, N. J. ....	991
*Nordstrom Valve Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa. ....	69
*North American Philips Co., Inc., Cryogenics Div., 100 Stevens Ave., Mt. Vernon, N. Y. ....	935
North-Erie and American Process Equipment Div., National-U. S. Radiator Corp., P. O. Box 231, Middletown, Pa. ....	850
*Norton Co., 1 New Bond St., Worcester 6, Mass. ....	1289, 1291
NoVo Div., Industrial Enterprises, Inc., 9705 Cottage Grove Ave., Chicago 28, Ill. ....	1030
Nukem Products Corp., Buffalo 20, N. Y. ....	1072

### O

Okadee Co., 332 S. Michigan Ave., Chicago 4, Ill. ....	1386
Overseas Div., General American Transportation Corp., 380 Madison Ave., New York 17, N. Y. ....	435, 436, 442
Owens-Corning Fiberglas Corp., Toledo 1, Ohio. ....	1266
Oxy-Catalyst, Inc., Wayne, Pa. ....	1343, 1345, 1347, 1349

### P

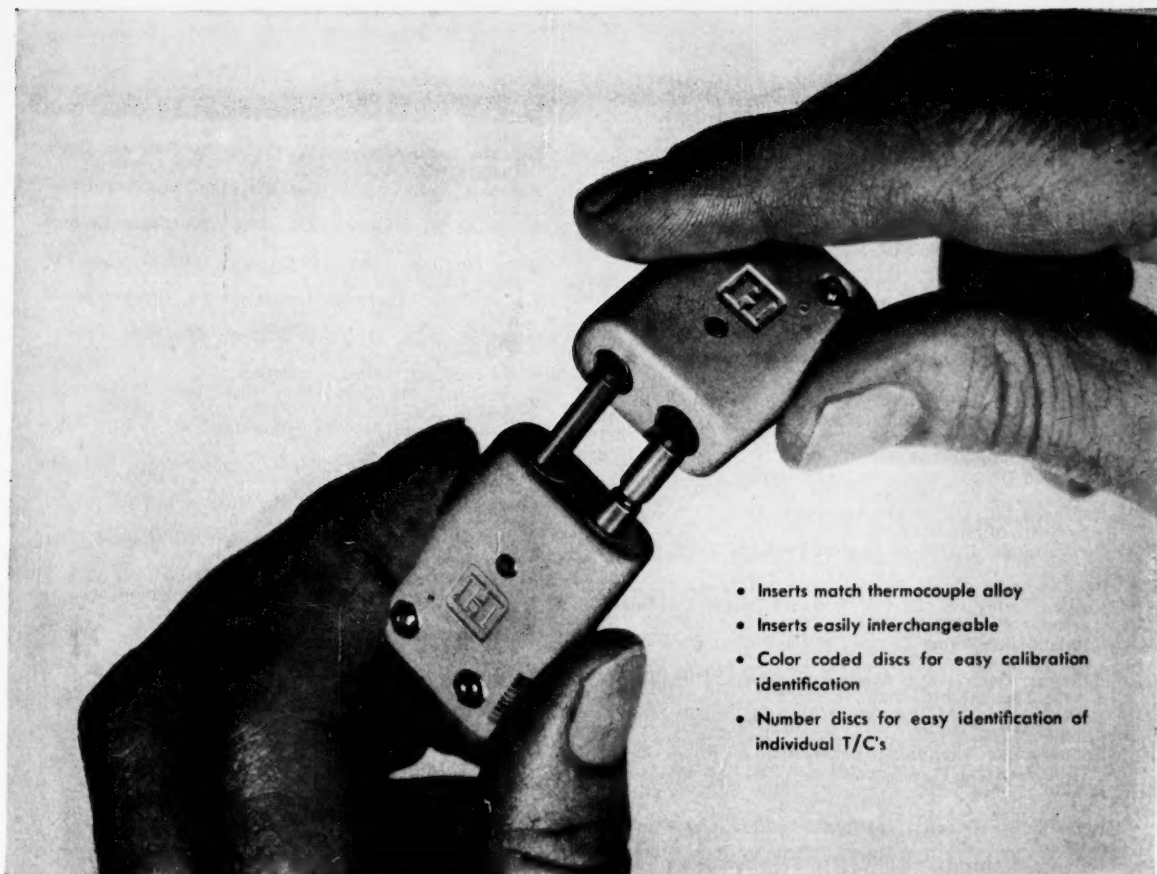
Pacific Valves, Inc., 3201 Walnut Ave., Long Beach 7, Calif. ....	1315, 1317
Package Research Laboratory, Rockaway, N. J. ....	1261, 1263
Packed Column Corp., 30 Church St., New York 7, N. Y. ....	1171
Pall Corp., Micro Metallic Div., 30 Sea Cliff Ave., Glen Cove, N. Y. ....	1012, 1014
Pallmann Pulverizers Co., 657 Franklin Ave., Garden City, L. I., N. Y. ....	1079
Palo Laboratories Supplies, Inc., 81 Reade St., New York 7, N. Y. ....	385
*Pangborn Corp., Hagerstown, Md. ....	681
Paquet & Co., Inc., M., Airsonic Industrial Stethoscopes, 17 Battery Place, New York 4, N. Y. ....	1374
Parker Fittings & Hose Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio ....	431
Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio ....	431
Parker Seal Co., Div. of Parker-Hannifin Corp., 10567 Jefferson Blvd., Culver City, Calif. ....	431
*Parks-Cramer Co., Fitchburg, Mass. ....	55
Patterson Foundry and Machine Co., E. Liverpool, Ohio ....	154
*Patterson-Kelley Co., Inc., 105 Warren St., E. Stroudsburg, Pa. ....	188 & 215

### Booth

Peabody Engineering Corp., 232 Madison Ave., New York 16, N. Y. ....	1321
Peerless Mfg. Co., Walnut Hill Lane at Old Denton Rd., P. O. Box 13165, Dallas, Tex. ....	1008
Peerless Pump Div., Food Machinery and Chemical Corp., 301 West Ave. Twenty-Six, Los Angeles 31, Calif. ....	831
Pennsylvania Fluorocarbon Co., Inc., 1115 N. 38th St., Philadelphia 4, Pa. ....	969
Perkin-Elmer Corp., Instrument Div., Main Ave., Norwalk, Conn. ....	386
Perkin Engineering Corp., 345 Kansas St., El Segundo, Calif. ....	996
Perlite Dept., Mining & Mineral Products Div., Great Lakes Carbon Corp., 612 S. Flower St., Los Angeles 17, Calif. ....	204
Permutit Co., Div. of Pfaudler Permutit Inc., 50 West 44th St., New York 36, N. Y. ....	110, 141
*Pfaudler Co., Div. of Pfaudler Permutit Inc., 1000 West Ave., Rochester 3, N. Y. ....	110, 141
*Philadelphia Gear Corp., G St. below Erie Ave., Philadelphia 34, Pa. ....	123
Photovolt Corp., 95 Madison Ave., New York 16, N. Y. ....	389
Pick Mfg. Co., West Bend, Wis. ....	1343, 1345, 1347, 1349
Pipe Div. Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio ....	68
*Pittsburgh Corning Corp., 1 Gateway Center, Pittsburgh 22, Pa. ....	1239
Plastic Metals Div., National-U. S. Radiator Corp., 342 Madison Ave., New York 17, N. Y. ....	850
Plastics Molding Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Plate & Welding Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Platecoil Div., Tranter Mfg. Inc., Lansing, Mich. ....	1206, 1210
Pocono Fabricators, Inc., 105 Warren St., E. Stroudsburg, Pa. ....	188 & 215
Podbielniak, Inc., 341 E. Ohio St., Chicago 11, Ill. ....	595
Porcelain Div., Ferro Corp., E. Liverpool, Ohio ....	154
Porter, Inc., George K., Bethlehem Pike, Hatfield, Pa. ....	1134, 1136
Posey Iron Works, Inc., Lancaster, Pa. ....	1407
Potter-Bowser Div., Bowser, Inc., 1302 E. Creighton Ave., Ft. Wayne 2, Ind. ....	396
*Potts Co., Horace T., Speedline Fittings Div., Erie Ave. & D St., Philadelphia 34, Pa. ....	980
*Powell Co., Wm., 2503-31 Spring Grove Ave., Cincinnati 22, Ohio ....	133
*Prater Pulverizer Co., 1515 So. 55th Court, Chicago 50, Ill. ....	904, 906
Precision Scientific Co., 3737 W. Cortland St., Chicago 47, Ill. ....	370, 372
Precision Thermometer & Instrument Co., 1434 Brandywine St., Philadelphia 30, Pa. ....	1401
Premier Equipment Co., 26-40 Jackson Ave., Long Island City 1, N. Y. ....	1259
*Premier Mill Corp., 224 Fifth Ave., New York 1, N. Y. ....	1391
Pressed Steel Tank Co., West Allis Station, Milwaukee 14, Wis. ....	631
Pressure Products Co., P.O. Box 424, Charleston 22, W. Va. ....	1409
Pressure Products Industries, Inc., Hatboro, Pa. ....	1367, 1369
Process Filters Div., Bowser, Inc., 1302 E. Creighton, Ft. Wayne, Ind. ....	1115
*Proctor & Schwartz, Inc., 7th St. & Tabor Rd., Philadelphia 20, Pa. ....	684
Productive Equipment Corp., 2926 W. Lake St., Chicago 12, Ill. ....	224
*Protectoseal Co., 1920 So. Western Ave., Chicago 8, Ill. ....	1286
Pulva Corp., 550 High St., Perth Amboy, N. J. ....	220
*Pulverizing Machinery Div., Metals Disintegrating Co., Inc., Chatham Rd., Summit, N. J. ....	632
Purrolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J. ....	15
Putman Publishing Co., 111 E. Delaware Place, Chicago 11, Ill. ....	880
Putnam Co., Inc., J. L., Houlton, Maine ....	1040, 1042

\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.





- Inserts match thermocouple alloy
- Inserts easily interchangeable
- Color coded discs for easy calibration identification
- Number discs for easy identification of individual T/C's

## **NEW QuiK-Konnect\* thermocouple components**

**For accurate, swift, and foolproof connection  
of thermocouples to extension wire**

New *QuiK-Konnect* plug and jack bodies give fast, easy, and foolproof extension wire connections in plant, laboratory or test cell installations.

Inserts have different diameter positive and negative poles, for foolproof connection . . . are extremely easy to remove for field calibration change or replacement. Various tube adapters are available to protect small-diameter thermocouples, and cable clamps can be supplied to protect extension wires from fraying or tearing.

The *QuiK-Konnect* line, in addition to plugs and jacks, includes:

1. Single-jack panel that fits  $\frac{3}{4}$ -in. knockout.
2. 4-point jack panel that fits standard electrical outlet box.
3. Multiple jack strips.
4. Custom-built multiple jack panels.
5. *QuiK-Kords\** for patch programming multiple jack panels.

You can get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, 21 Penn St., Fall River, Mass.

\*Trademarks

# **Honeywell**



*First in Control*

# Exhibitors

## 27th Exposition of Chemical Industries

### Q

**Quaker Oats Co., Chemicals Div., Merchandise Mart Plaza, Chicago 54, Ill. . . . .** 953

### R

RKL Controls, Inc., Mt. Laurel Rd., Hainesport, N. J. . . . . 1405  
Radiation Counter Laboratories, 5121 W. Grove St., Skokie, Ill. . . . . 1071  
Radiation Electronics Co., 8241 North Kimball Ave., Skokie, Ill. . . . . 1155, 1157  
Rapid Machinery Co., Inc., Marion, Iowa . . . . . 1162  
\*Raybestos-Manhattan, Inc., Passaic, N. J. . . . . 820  
Raymond Div., Combustion Engineering, Inc., 1132 W. Blackhawk St., Chicago 22, Ill. . . . . 646  
Raytheon Co., Industrial Apparatus Div., 87 So. Bedford St., Manchester, N. H. . . . . 1442  
Read Standard, Div. of Capitol Products Corp., York, Pa. . . . . 162  
Redveco, 1 Exchange Pl., Jersey City 2, N. J. . . . . 1098  
Reeves Pulley Co., Div. of Reliance Electric & Engineering Co., 1225 Seventh St., Columbus, Ind. . . . . 10  
Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. . . . . 86  
\*Reliance Electric and Engineering Co., 24701 Euclid Ave., Cleveland 19, Ohio . . . . . 10  
Renneburg & Sons Co., Edw., 2639 Boston St., Baltimore 24, Md. . . . . 1078  
Republic Lead Equipment Co., 7930 Jones Road, Cleveland, Ohio . . . . . 111  
Republic Seitz Filter Corp., 17 Stone St., Newark 4, N. J. . . . . 977  
\*Republic Steel Corp., 1441 Republic Bldg., Cleveland 1, Ohio . . . . . 68  
Research Controls, 7900 E. 11th St. (Box 5035) Tulsa, Okla. . . . . 1186  
Research & Development Dept., General American Transportation Corp., Chicago 3, Ill. . . . . 435, 436, 442  
\*Resistoflex Corp., Woodland Rd., Roseland, N. J. . . . . 893, 897  
Rheem Mfg. Co., 1701 W. Edgar Rd., Linden, N. J. . . . . 808, 810  
\*Richardson Scale Co., Clifton, N. J. . . . . 1151, 1153  
Rietz Mfg. Co., P.O. Box 690, West Chester, Pa. . . . . 1231  
\*Robbins & Myers, Inc., Moyno Pump Div., Springfield, Ohio . . . . . 1254  
\*Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div., Santa Ana Freeway at Euclid Ave., Anaheim, Calif. . . . . 1366, 1368  
\*Robertshaw-Fulton Controls Co., Fulton Sylphon Div., P.O. Box 400, Knoxville 1, Tenn. . . . . 1293  
\*Rochester Mfg. Co., Inc., 100 Rockwood St., Rochester 10, N. Y. . . . . 943  
\*Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa. . . . . 69  
Rockwood Sprinkler Co., Div. of Gamewell Co., 38 Harlow St., Worcester 5, Mass. . . . . 1238, 1271-1273  
\*Ross & Son Co., Inc., Charles, 148-156 Classon Ave., Brooklyn 5, N. Y. . . . . 983, 985  
Ruska Instrument Corp., 6121 Hillcroft Ave., Houston, Tex. . . . . 1071

### S

Safety Industries, Inc., P.O. Box 904, New Haven 4, Conn. . . . . 645  
\*Saran Lined Pipe Co., 2415 Burdette Ave., Ferndale, Mich. . . . . 913  
\*Sarco Co., Inc., 635 Madison Ave., New York 22, N. Y. . . . . 93  
\*Sargent's Sons Corp., C. G., Graniteville, Mass. . . . . 1375, 1377  
Sargent & Co., E. H., 4647 W. Foster Ave., Chicago 30, Ill. . . . . 1394

### Booth

Scam Instrument Corp., 1811 W. Irving Park Dr., Chicago, Ill. . . . . 1230, 1232  
Schmieg Industries, Inc., 26-40 Jackson Ave., Long Island City 1, N. Y. . . . . 1259  
Schutte and Koerting Co., Cornwells Heights, Bucks County, Pa. . . . . 61  
Schutz-O'Neill Co., 307 Portland Ave., Minneapolis 15, Minn. . . . . 1028  
Scientific Development Co., Box 795, State College, Pa. . . . . 382  
Scientific Glass Apparatus Co., Inc., 100 Lakewood Terrace, Bloomfield, N. J. . . . . 332  
Sealol Corp., Warwick Industrial Pk., Providence 5, R. I. . . . . 1281  
Seavy & Sons, M. J., 30 Church St., New York 7, N. Y. . . . . 1071  
\*Selas Corp. of America, Dresher, Pa. . . . . 979, 981  
Sellers Injector Corp., 1600 Hamilton St., Philadelphia 30, Pa. . . . . 1376  
\*Sharples Corp., 2300 Westmoreland St., Philadelphia 40, Pa. . . . . 485  
Sheet and Strip Div., Republic Steel Corp., Republic Bldg., Cleveland 1, Ohio . . . . . 68  
Sheldon Equipment Co., E. H., Muskegon, Mich. . . . . 336  
\*Shriver & Co., Inc., T. Harrison, N. J. . . . . 473  
Sier-Bath Gear & Pump Co. Inc., 9252 Hudson Blvd., No. Bergen, N. J. . . . . 806  
\*Sigmamotor, Inc., 3 No. Main St., Middleport, N. Y. . . . . 1099  
Simon-Carter Co., 655 19th Ave., N.E., Minneapolis 18, Minn. . . . . 1096  
Simpson Co., Orville, 1230 Knowlton St., Cincinnati 23, Ohio . . . . . 1150  
Sly Manufacturing Co., The W. W., 4700 Train Ave., Cleveland 1, Ohio . . . . . 73  
Smith Co., T. L., 2835 N. 32nd St., Milwaukee 1, Wis. . . . . 986  
Snyder Corp., Arthur Colton Co. Div., 3400 E. Lafayette Ave., Detroit 7, Mich. . . . . 50  
Sonic Engineering Corp., 146 Selleck St., Stamford, Conn. . . . . 1122  
Sorvall, Inc., Ivan, Pearl St., Norwalk, Conn. . . . . 342  
Southwestern Engineering Co., 4800 Santa Fe Ave., P.O. Box 58264, Vernon Station, Los Angeles 58, Calif. . . . . 1250, 1252  
\*Sparkler Mfg. Co., 169 North Lake St., Mundelein, Ill. . . . . 56  
Specialty Machinery Corp., 50 Roanoke Ave., Newark 5, N. J. . . . . 1413, 1430  
Speedline Fittings Div., Horace T. Potts Co., Erie Ave. & D St., Philadelphia 34, Pa. . . . . 980  
\*Sperry & Co., D. R., Batavia, Ill. . . . . 1362  
\*Spray Engineering Co., 100 Cambridge St., Route 3A, Burlington, Mass. . . . . 1229  
\*Spraying Systems Co., 3201 Randolph St., Bellwood, Ill. . . . . 914  
\*Sprout, Waldron & Co. Inc., Muncy, Pa. . . . . 846, 848  
Stainless Products Corp., 314 W. Main St., Belding, Mich. . . . . 1158  
Standard Steel Corp., 5001 S. Boyle Ave., Los Angeles 58, Calif. . . . . 153  
Star Tank and Filter Corp., 875 Edgewater Rd., New York 59, N. Y. . . . . 233  
Stearns Magnetic Products, A Div. of Indiana General Corp., 635 S. 28 St., Milwaukee, Wisc. . . . . 131  
Steel and Tubes Div., Republic Steel Corp., 224 E. 131st St., Cleveland 8, Ohio . . . . . 68  
Steinen Mfg. Co., Wm., 43 Bruen St., Newark 5, N. J. . . . . 1194, 1196  
Sterling, Fleischman Co., P. O. Box 94, Broomall, Pa. . . . . 1077  
Sticht Co., Inc., Herman H., 27 Park Place, New York 7, N. Y. . . . . 1280  
Stoffel Seals Corp., Tuckahoe, N. Y. . . . . 1257  
\*Stokes Corp., F. J., 5500 Tabor Rd., Philadelphia 20, Pa. . . . . 38, 67  
\*Strahman Valves, Inc., Nicolet Ave., Florham Park, N. J. . . . . 815  
\*Strong, Carlisle & Hammond, 508 Sandusky St., Conneaut, Ohio . . . . . 1121  
\*Strong-Scott Mfg. Co., 451 Taft St. N.E., Minneapolis 13, Minn. . . . . 1274, 1276, 1278  
\*Sturtevant Mill Co., Park & Clayton Sts., Dorchester, Boston 22, Mass. . . . . 421  
\*Superior Electric Co., Bristol, Conn. . . . . 804

\* For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

	Booth
Superior Tube Co., Norristown, Pa. ....	1200
Supreme Div. Franklin P. Miller & Son, Inc., 36 Meadow St., E. Orange 38, N. J. ....	1010
Sutorbilt Corp., Subsidiary of Fuller Co., 2966 E. Victoria St., Compton, Calif. ....	446
Swepeco Tube Corp., 1 Clifton Blvd., Clifton, N. J. ....	834
Syntron Co., Homer City, Pa. ....	163

## T

Tank Car Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Tank Storage Terminals Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
*Taylor Instrument Companies, 95 Ames St., Rochester 1, N. Y. ....	104
Taylor, Stiles & Co., Riegelsville, N. J. ....	1357
Technicon Controls, Inc., Chauncey, N. Y. ....	316
Tenso-Lab, Inc., Irvington-on-Hudson, N. Y. ....	1123
Terriss Div., Consolidated Siphon Supply Co., Inc., 22-24 Wooster St., New York 13, N. Y. ....	1329, 1331
*Thayer Scale Corp., Pembroke, Mass. ....	1348, 1350, 1352
*Thermo Electric Co., Inc., Rochelle Park Post Office, Saddle Brook, N. J. ....	817
Thermon Mfg. Co., 1017 Rosine, P. O. Box 1961, Houston 1, Tex. ....	1207
Tompson-Ramo-Woodridge Products Co., P. O. Box 90067, Airport Station, Los Angeles 45, Calif. ....	13
Titanium Alloy Mfg. Div., National Lead Co., 111 Broadway, New York 6, N. Y. ....	234
*Toledo Scale Div., Toledo Scale Corp., Toledo 13, Ohio ....	157
*Tolhurst Centrifugals Div., American Machine and Metals, Inc., E. Moline, Ill. ....	506
Torsion Balance Co., Clifton, N. J. ....	328
*Tote System, Inc., 700 South 7th St., Beatrice, Neb. ....	858, 860
*Tranter Mfg. Inc., Platecoil Div., Lansing, Mich. ....	1206, 1208, 1210
*Traylor Engineering & Manufacturing Div., Fuller Co., Allentown, Pa. ....	495
Trent, Inc., 201-299 Leverington Ave., Philadelphia 27, Pa. ....	195
Trerice Co., H. O., 1420 W. Lafayette Blvd., Detroit 16, Mich. ....	1287
Tri-Homo Corp., 90 Highland Ave., Salem, Mass. ....	214
Trinity Equipment Corp., Cortland, N. Y. ....	1392
Tri-Rotor Inc., 36 East Lawton St., Torrington, Conn. ....	1439
*Tube Turns Div., Chemetron Corp., 224 E. Broadway, Louisville 2, Ky. ....	98
Tube Turns Plastics, Inc., 2929 Magazine St., Louisville 11, Ky. ....	96
Turbo-Mixer Div., General American Transportation Corp., Chicago 3, Ill. ....	435, 436, 442
Tyler Co., W. S., 3615 Superior Ave., Cleveland 14, Ohio ....	574

## U

*Uehling Instrument Co., 473 Getty Ave., Paterson 3, N. J. ....	364
Union Bag-Camp Paper Corp., 233 Broadway, New York 7, N. Y. ....	1296, 1298
*Union Carbide Corp., 30 East 42nd St., New York 17, N. Y. ....	460, 470
*Union Carbide Metals Co., Div. of Union Carbide Corp., 30 East 42nd St., New York 17, N. Y. ....	460, 470
Union Process Co., 120 Ash St., Akron, Ohio. ....	1311, 1313
Union Steel Corp., Union, N. J. ....	840
United Box & Lumber Co., 45 Wheeler Point Rd., Newark 5, N. J. ....	1085
United States Borax & Chemical Corp., 50 Rockefeller Plaza, New York 20, N. Y. ....	918, 920
U. S. Electrical Motors Inc., Box 2058 Terminal Annex, Los Angeles 54, Calif. ....	837
United States Filter Co., 1910 N. Potrero Ave., El Monte, Calif. ....	1139, 1141, 1143
U. S. Hoffman Machinery Corp., Air Appliance Div., 103 Fourth Ave., New York 3, N. Y. ....	1365
U. S. Mixers Div., Stockdale Engineering Co., P. O. Box 144, Haddonfield, N. J. ....	1237

## Booth

United States Steel Corp., 525 William Penn Pl., Pittsburgh 30, Pa. ....	590
*United States Stoneware Co., 60 East 42nd St., New York 17, N. Y. ....	111

## V

Vac-U-Max, 1 Montgomery St., Belleville, N. J. ....	1195, 1197
Van Nostrand Co., Inc., D., 120 Alexander St., Princeton, N. J. ....	866
Vanton Pump & Equipment Corp., Div. of Cooper Alloy Corp., 201 Sweetland Ave., Hillside, N. J. ....	103
Velan Steam Specialties Inc., Beekmantown Rd., Plattsburgh, N. Y. ....	1300
Velan Valve Corp., Beekmantown Rd., Plattsburgh, N. Y. ....	1300
Vibra Screw Feeders Inc., 156 Huron Ave., Clifton, N. J. ....	1138, 1142
Vibro-Plus Products, Inc., Stanhope, N. J. ....	1393
Victaulic Co. of America, 835 Lehigh Ave., Union, N. J. ....	1190, 1192
Victor Chemical Works, 155 No. Wacker Drive, Chicago 6, Ill. ....	936, 938, 940, 963
*Vogt Machine Co., Henry, 1000 W. Ormsby St., Louisville 10, Ky. ....	124
Von Arx Air Tool Co., 51 Pine St., New York 5, N. Y. ....	1440
Voss Co., Inc., J. H. H., 785 East 144th St., New York 54, N. Y. ....	1224

## W

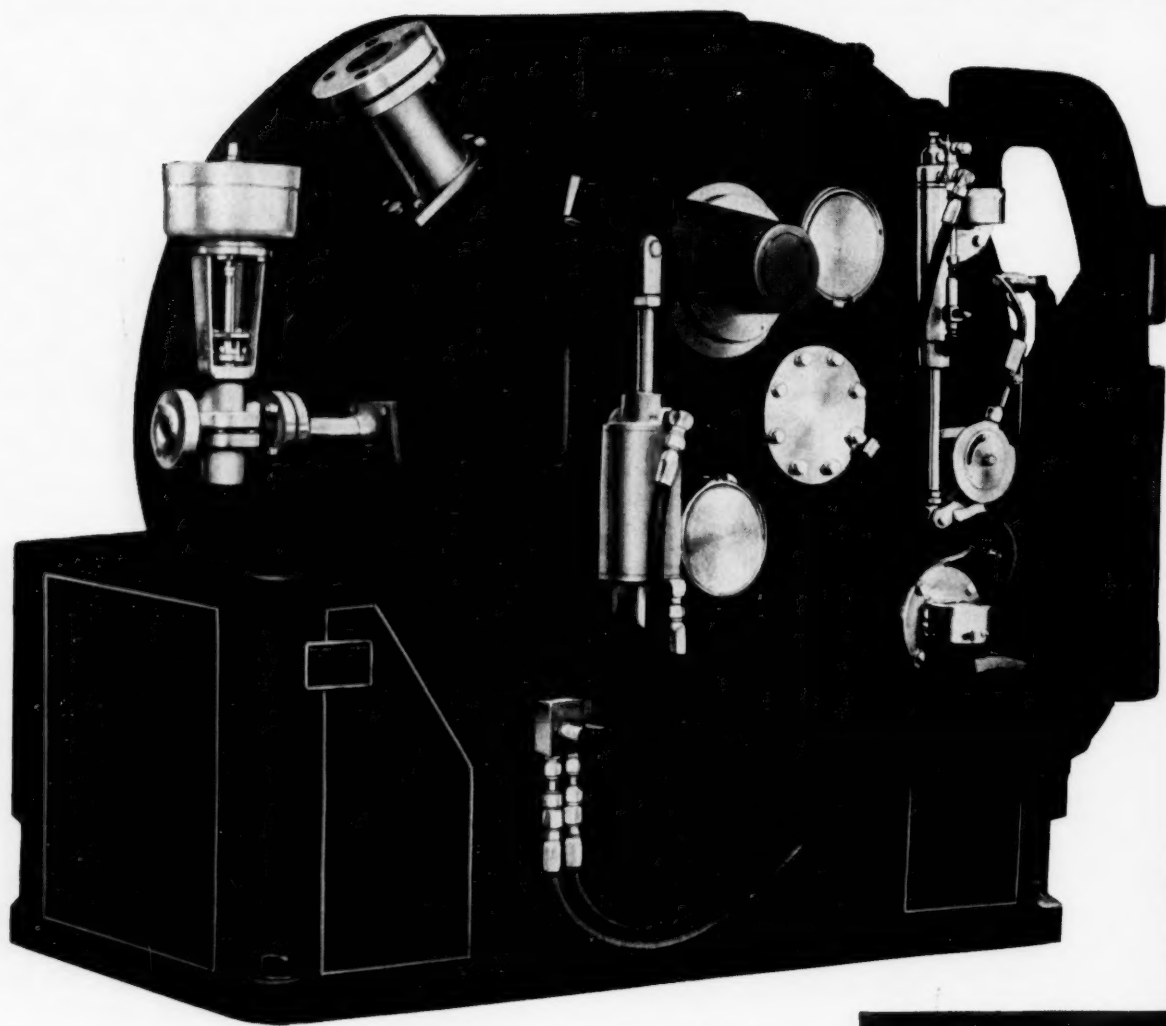
*W-K-M Div., ACF Industries, Inc., P. O. Box 2117, Houston 1, Tex. ....	941
Walker, Crosswell & Co., Ltd., Whaddon Works, Cheltenham, Glos., England. ....	1343, 1345, 1347, 1349
*Wallace & Tiernan Inc., 25 Main St., Belleville, N. J. ....	686
Walworth Co., 750 Third Ave., New York 17, N. Y. ....	26
*Warren Pumps, Inc., Warren, Mass. ....	1277, 1279
Warrick Co., Charles F., 1964 W. Eleven Mile Rd., Berkeley, Mich. ....	1343, 1345, 1347, 1349
*Waukesha Foundry Co., Waukesha, Wis. ....	1387, 1389
Welch Mfg. Co., W. M., 1515 Sedgwick St., Chicago 10, Ill. ....	205
West Instrument Corp., 4363 W. Montrose Ave., Chicago 41, Ill. ....	1230, 1232
West Virginia Pulp and Paper Co., Industrial Chemical Sales Div., 230 Park Ave., New York 17, N. Y. ....	924, 926
Western Machinery Co., 650 Fifth St., San Francisco 7, Calif. ....	1044, 1046
*Western Precipitation Corp., 1000 West 9th St., Los Angeles 15, Calif. ....	1181
*Western States Machine Co., Hamilton, Ohio. ....	1168, 1170, 1172
*Westinghouse Electric Corp., 3 Gateway Center, P. O. Box 2278, Pittsburgh 30, Pa. ....	510
Wheelabrator Corp., Mishawaka, Ind. ....	190
Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill. ....	395
*Williams Patent Crusher & Pulverizer Co., 2701-2723 No. Broadway, St. Louis 6, Mo. ....	161
Wilmot Castle Co., 1777 E. Henrietta Rd., Rochester, N. Y. ....	1033
*Wolverine Tube Div., Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich. ....	1111
*Worcester Valve Co., Inc., 18 Parker St., Worcester, Mass. ....	1163, 1165
Worthington Corp., Harrison, N. J. ....	545

## Y

*Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, Pa. ....	49
Yeomans Brothers Co., 1999 N. Ruby St., Melrose Park, Ill. ....	1156
York Co., Inc., Otto H., 6 Central Ave., W. Orange, N. J. ....	85
Young Machinery Co., Inc., Muncy, Pa. ....	1087
Young Radiator Co., Racine, Wis. ....	1403
Yuba Consolidated Industries, Inc., 1275 California Ave., Palo Alto, Calif. ....	882, 884, 886

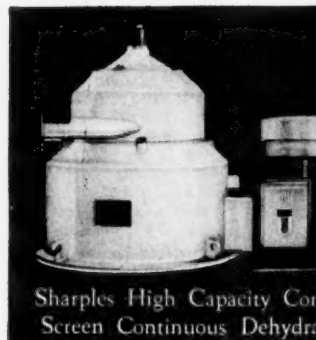
\*For more information see advertisement in this issue. Chemical Engineering advertisers listed in bold face type.

**years - ahead**



SHARPLES C-41 Super-D-Hydrator  
for operation at pressures to 150 psi.

**BOOTH 485**  
**AT THE TOP OF THE ESCALATOR**



Sharples High Capacity Cor  
Screen Continuous Dehydra



**THE SHARPLES CORPORATION**

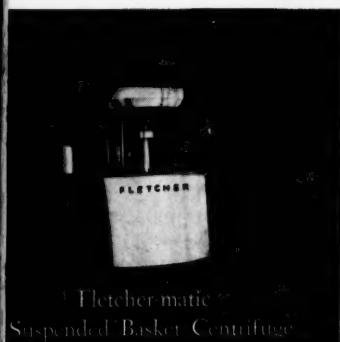
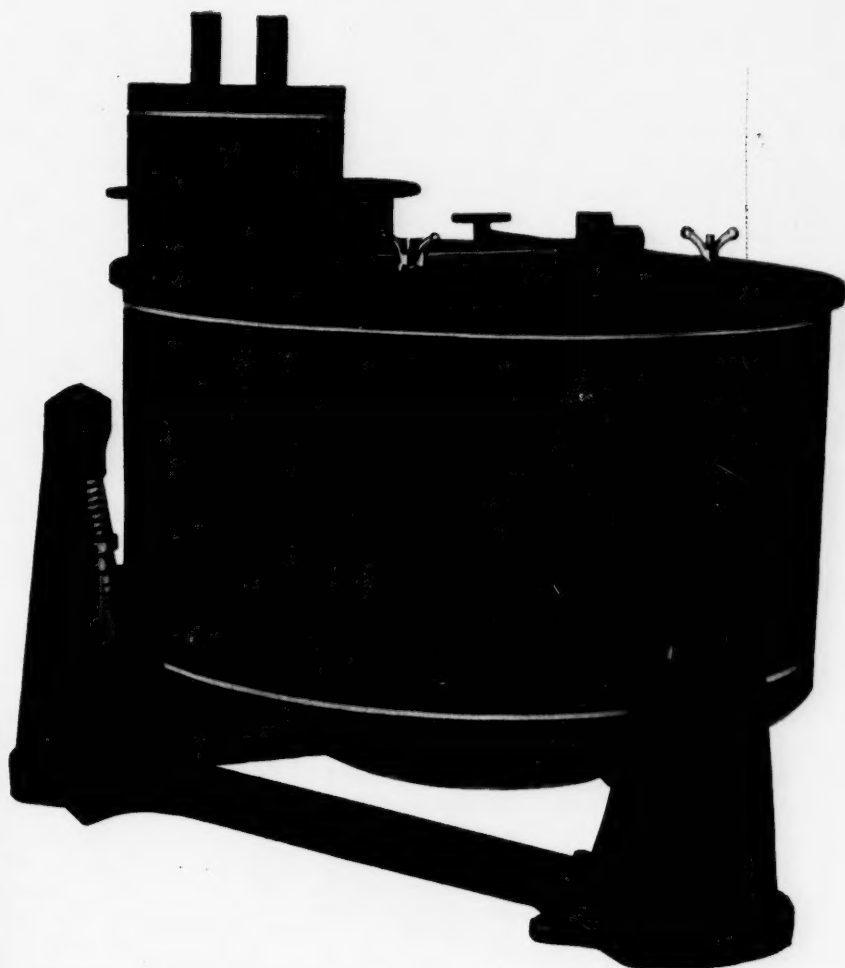
*Centrifugal and Process Engineers*

2300 WESTMORELAND STREET / PHILADELPHIA 40, PENNSYLVANIA  
NEW YORK • PITTSBURGH • CLEVELAND • DETROIT • CHICAGO • HOUSTON • SAN FRANCISCO • LOS ANGELES • ST. LOUIS • ATLANTA  
Associated Companies and Representatives throughout the World



# centrifuges by Sharples

Fletcher "Tornado" Automatic  
Vertical Basket Centrifuge



Fletcher "matic"  
Suspended Basket Centrifuge



a division of The **SHARPLES** CORPORATION

BOOTH 459

# Line-up of Products Exhibited

27th Exposition of Chemical Industries

New York Coliseum

Nov. 30-Dec. 4, 1959

## ABRASIVES

*Allied Chemical Corp.	955-957-959-961
*Norton Co.	1289-1291
Pangborn Corp.	681
Titanium Alloy Mfg. Div., National Lead Co.	234
Wheelabrator Corp.	190

## ABSORBERS

*Allied Chemical Corp.	955-957-959-961
*Barnebey-Cheney Co.	52
Carbone Corp.	803
Croll-Reynolds Co., Inc.	1054
Falls Industries, Inc.	131
*Fansteel Metallurgical Corp.	617
General Alloys Co.	193
*General American Transportation Corp.	435-436-442-446-495
General Ceramics Corp.	131
*Haveg Industries, Inc.	546
Heat Transfer Div., National-U. S. Radiator Corp.	850
Knapp Mills, Inc.	175
Knight Co., Maurice A.	586
Lead Industries Assn.	816
*National Carbon Co.	460-470
National-U. S. Radiator Corp.	850
Packed Column Corp.	1171
Peabody Engineering Corp.	1321
Porter, Inc., George K.	1134-1136
Scientific Glass Apparatus Co., Inc.	332
*U. S. Stoneware Co.	111
Yeomans Brothers Co.	1156

## ACIDS

*Allied Chemical Corp.	955-957-959-961
Armour Industrial Chemical Co.	932-934
Continental Oil Co.	930
*Hercules Powder Co.	916
The Quaker Oats Co., Chemical Div.	953
Scientific Glass Apparatus Co., Inc.	332
U. S. Borax & Chemical Corp.	918-920
Victor Chemical Works.	936-938-940-963

## ACIDIFIERS

Scientific Glass Apparatus Co., Inc.	332
--------------------------------------	-----

## ACID RESISTING MATERIALS

*Aeroquip Corp.	1255
*Allied Chemical Corp.	955-957-959-961

Ampeco Metal, Inc.	412
Appareils Gachot	1095
Bishop & Co., J., Platinum Works	900-902
*Corning Glass Works	134
*Du Verre, Inc.	891
Ethylene Corp.	971
Falls Industries, Inc.	131
Filtros Inc.	854-856
General Ceramics Corp.	131
Glascote Products, Inc.	596
*Haynes Stellite Co., Div. of Union Carbide Corp.	460-470
Heil Process Equipment Corp.	1305
Hercules Powder Co.	916
Industrial Plastic Fabricators, Inc.	1102
Knapp Mills, Inc.	175
Knight Co., Maurice A.	586
Lead Industries Assn.	816
Lead Lined Iron Pipe Co.	70
Lebanon Steel Foundry	20
*Metal Cladding, Inc.	1378
Miller Products Co., Inc.	1091
*Nalge Co., Inc.	1201
*National Carbon Co.	460-470
National Tube Div., United States Steel Corp.	590
Nukem Products Corp.	1072
*Pfaudler Permutit, Inc.	110-141
*Raybestos-Manhattan, Inc.	820
*Republic Steel Corp.	61
Scientific Glass Apparatus Co., Inc.	332
*Strong, Carlisle & Hammond	1121
*U. S. Stoneware Co.	111

## ADHESIVES

*Allied Chemical Corp.	955-957-959-961
Fibercast Co., Div., Youngstown Sheet and Tube Co.	870
Raybestos-Manhattan, Inc.	820
Scientific Glass Apparatus Co., Inc.	332
*U. S. Stoneware Co.	111

## AGITATORS

Alsop Engineering Corp.	381
*Artisan Metal Products	874
*Chemineer, Inc.	1220
Cleveland Mixer Co.	1067-1069
Colton Co., Arthur, Div., Snyder Corp.	50
*Day Co., J. H., Div. of Cleveland Automatic Machine Co.	121-122
Denver Equipment Co.	1146
*Devine Mf. Co., J. P.	1372
*Dorr-Oliver Inc.	531
*Eastern Industries, Inc.	1275
*Eimco Corp.	80
Ertel Engineering Corp.	623
Gabb Special Products, Inc.	1106

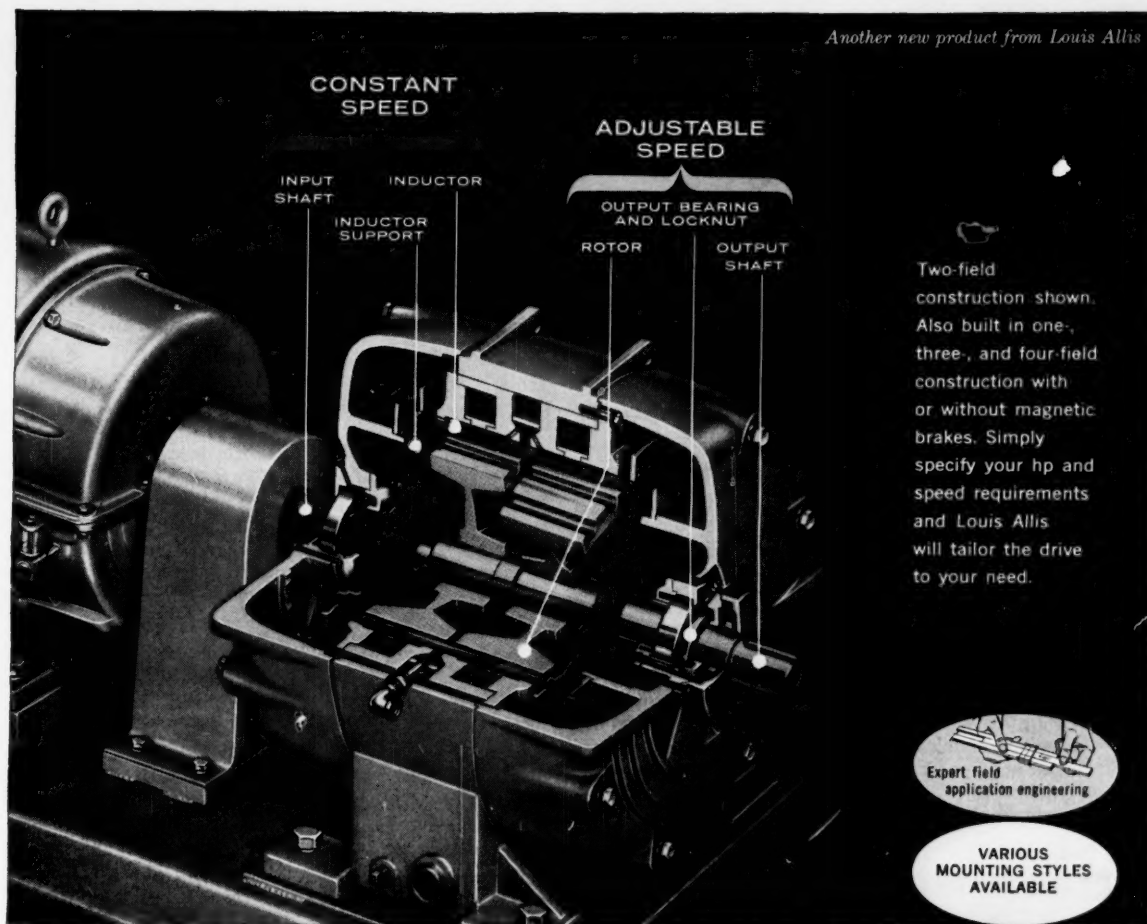
Galigher Co.	843
*General American Transportation Corp.	436-442-446-495
General Laboratory Supply Co.	310
Gifford-Wood Co.	219
Glascote Products, Inc.	596
Gump Co., B. F.	1024-1026
*Hardinge Co., Inc.	582
*Haveg Industries, Inc.	546
Hockmeyer & Co., Herman	1178
Industrial Products Engineering Co.	1259
International Process Equipment Co., Inc.	812
Knapp Mills, Inc.	175
Lee Metal Products Co., Inc.	1384
Lehmann Co., Inc., J. M.	1429-1431-1446
Mixing Equipment Co. Inc.	146
*Morehouse-Cowles, Inc.	814
Nalge Co., Inc.	1201
*Netco Corp.	79
North-Erie and American Process Equipment Div., National-U. S. Radiator Corp.	850
Patterson Foundry and Machine Co.	154
Philadelphia Gear Corp.	123
*Premier Mill Corp.	1391
Pressure Products Industries, Inc.	1367-1369
Read Standard, A Div. of Capitol Products Corp.	162
*Ross & Son Co., Inc., Charles	983-985
Schutte and Koerting Co.	61
Scientific Glass Apparatus Co., Inc.	332
Sonic Engineering Corp.	1122
Specialty Machinery Corp.	1413-1430
Sprout, Waldron & Co., Inc.	846-848
Stainless Products Corp.	1158
Star Tank & Filter Corp.	233
Syntron Co.	163
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
U. S. Mixers, Div. of Stockdale Engineering Co.	1237
Yeomans Brothers Co.	1156

## AIR CONDITIONING APPARATUS

American Air Filter Co., Inc.	676
Barnebey-Cheney Co.	52
Bryant Mfg. Co.	1089
Drayer Hanson Div., National-U. S. Radiator Corp.	850
*Frick Co.	1258-1260
*Fulton Sylphon Div., Robertshaw-Fulton Controls Co.	1293
National-U. S. Radiator Corp.	850
Niagara Blower Co.	655
Voss Co., Inc., J. H. H.	1224
*Westinghouse Electric Corp.	510
Worthington Corp.	545

(Turn to p. 308)

\* For additional information see advertisement in this issue. Compiled from information supplied to International Exposition Co. No responsibility assumed for errors or omissions.



Two-field construction shown. Also built in one-, three-, and four-field construction with or without magnetic brakes. Simply specify your hp and speed requirements and Louis Allis will tailor the drive to your need.

Expert field application engineering

VARIOUS MOUNTING STYLES AVAILABLE

## The new Louis Allis **MAGNETIC DRIVE**

### A compact, adjustable speed drive up to 2000 hp!

Based on a liquid-cooled magnetic coupling design, the *all-new* Louis Allis Magnetic Drive offers you the finest in precise regulation, compactness, and design flexibility for adjustable speed drives up to 2000 hp.

A unique annular cooling manifold provides effective heat transfer. It eliminates "water-drag" since there is no liquid in the air gap between the constant-speed and adjustable-speed members. There's no "flooding" the Magnetic Drive or forcing of water into bearings. And you'll *never* find condensation in the bearings. The reason: a planned flow of air through the drive reduces bearing temperatures and exhausts any condensation which might occur as the unit cools off after use.

Stationary field construction eliminates slip rings. All bearings can be lubricated without disassembly, and grease chambers provide ample grease reservoirs. Coils and lead connections are encapsulated in a chemical- and heat-resistant polyester — and simplified construction eases inspection and servicing. The *all-new* design permits simple relocation of cooling inlet, conduit box, discharge, etc., regardless of direction of rotation.

If your plans call for adjustable speed drives — specify Louis Allis Adjustable Speed Magnetic Drive. Write for a copy of Bulletin 3650 — now available at your Louis Allis District Office, or from The Louis Allis Co., 447 E. Stewart Street, Milwaukee 1, Wisconsin.

## LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

ASD-135

# Now...A Packless Metering Pump\*

**ACCURACY! ECONOMY! DEPENDABILITY!**  
**Proven Masterline Design!**  
**Eliminate Costly Down Time and Maintenance with These Unique Features**

- Packless Liquid End Construction
- Flooded Suction Not Required
- Constant Volumetric Displacement
- Design Eliminates Entrained Air On Hydraulic Side
- Built-in Safety Relief Valve
- Interchangeable With Standard Masterline Liquid Ends
- Plus All Regular Masterline Features: Simplified crank drive, pre-tested accuracy, sturdy construction, separate motor and speed reducer, adaptable for automatic or remote control . . . everything to insure dependable operation at lowest maintenance cost.

\*PATS. APPL. FOR

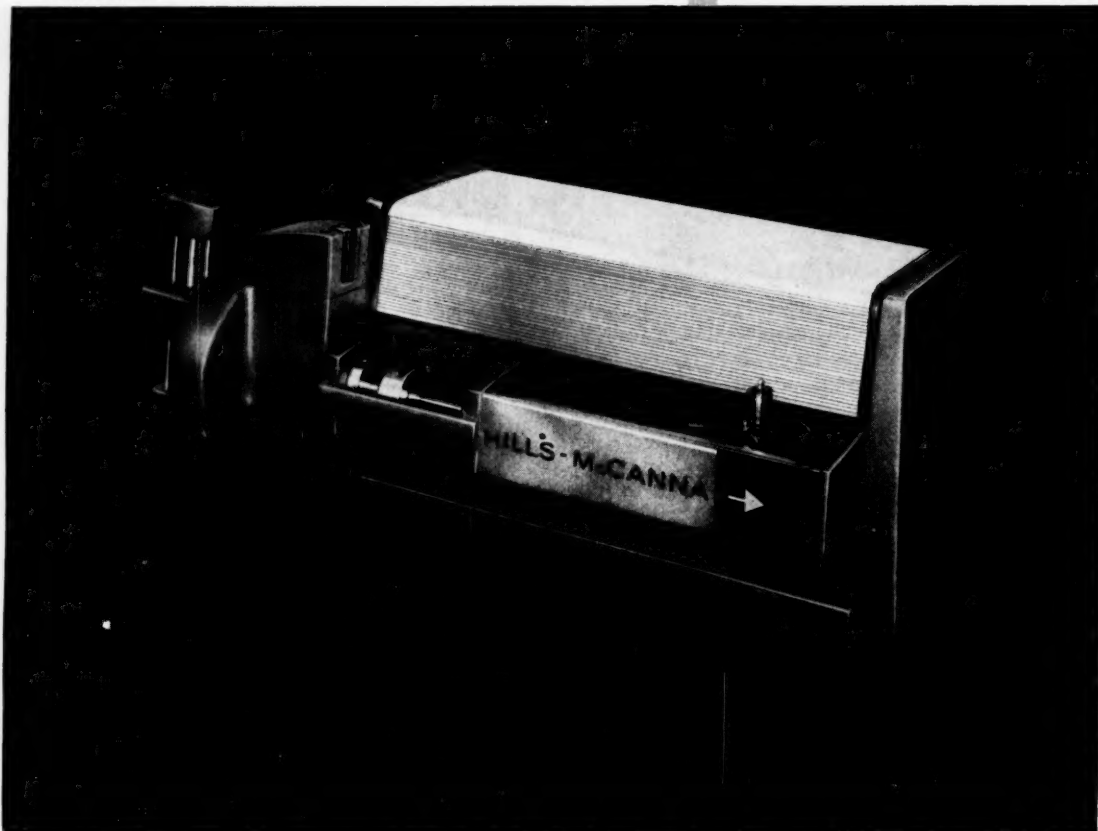


**SEND** for our new specification sheet with full data on the Masterline Packless Metering Pump #903

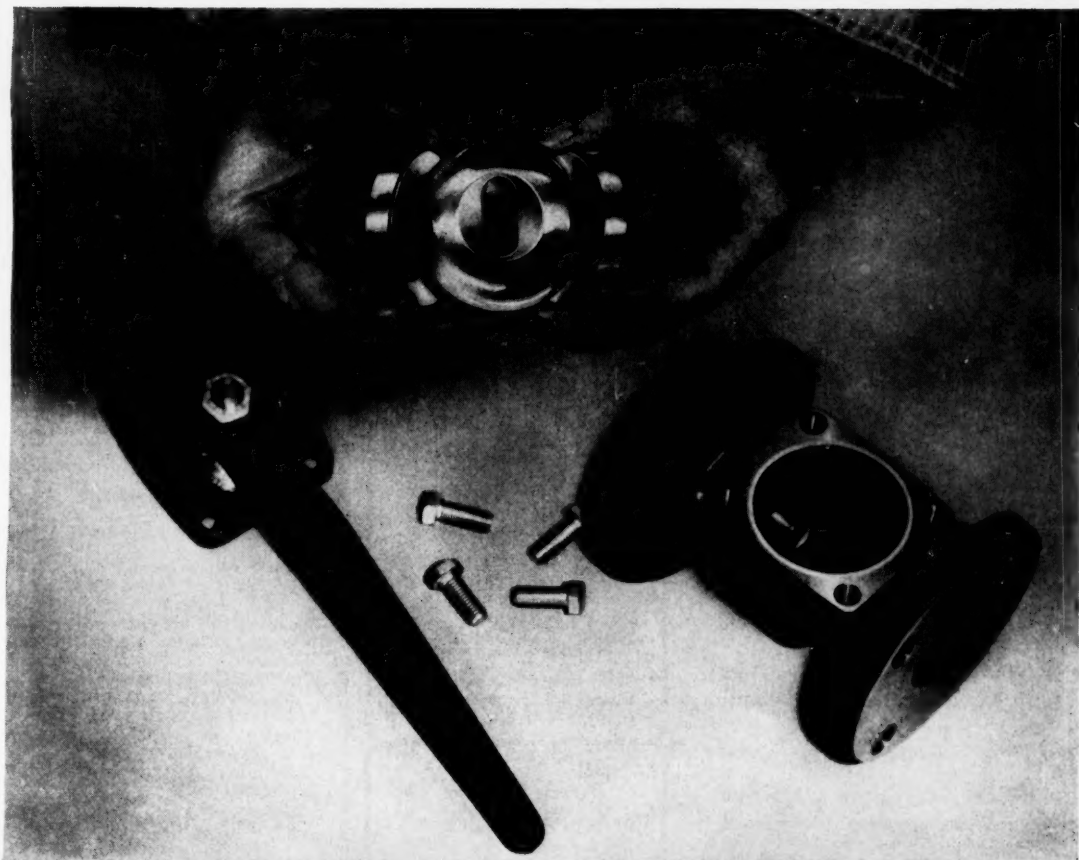
**HILLS-McCANNA COMPANY**  
 4568 West Touhy Ave. • Chicago 46, Ill.

See us at the Chemical Show Nov. 30-Dec. 4  
 Booths 1173, 1174, 1175, 1176

*Hills-  
 mcCanna  
 company*







## Now a BALL VALVE\* with all the features you've wanted

Thirty years of leadership in valve manufacture now brings you the Hills-McCanna Ball Valve! It offers every advanced feature to help you cut costs, step up production, reduce maintenance, and improve product quality.

- Drip Tight Shut-Off
- Self Adjusting Seats For Extended Valve Life
- Top Entry For Easy In-Line Maintenance
- Quick Opening
- Minimum Pressure Drop
- Two-Way Flow
- Reduced Maintenance Cost



Save money!...solve valving problems ...send for free booklet describing the complete line of Hills-McCanna Ball Valves. Send for your copy of booklet #1100.

**HILLS-McCANN COMPANY**  
4568 West Touhy Ave. • Chicago 46, Ill.  
See us at the Chemical Show Nov. 30 •  
Dec. 4, Booths 1173, 1174, 1175, 1176

\*PATS. APPL. FOR

*hills-  
mcCanna  
company*

# TO IMPROVE SOLIDS-LIQUID SEPARATION PROCESSES

## Consider

### MULTI-METAL FILTER MEDIA

**Wire Cloth and Filter Cloth** in all alloys, and every degree of density down to 400 mesh and in all weaves.

**"Neva-Clog"** perforated sheet metal medium functions on edge filtration principle.

**"Micromesh"**—an ultrafine weave filter medium with a particle retention as low as 10 microns, made in corrosion-resisting alloys.

### MULTI-METAL FABRICATIONS

A complete, comprehensive and versatile service in converting filter media into filtration or other processing components or complete units:

Filter leaves for all pressure and vacuum filters; screens for plate and frame presses; tubular filter elements; strainers; vibrating screens; baskets; hoppers; cylinders; elements for dryers, catalyst units, washers, mixers, etc., and complete apparatus or machinery.



Catalog 57 gives helpful, practical information on Multi-Metal research, engineering and product services for better methods and means of solids-liquid separation. Write for a free copy.

## MULTI-METAL WIRE CLOTH CO., INC.

1353 Garrison Ave., New York 59, N. Y.

Visit Booth 191, Chemical Exposition, Coliseum, New York



"Multibraid" (magnified); dense, strong, woven filter cloth.

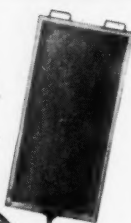


"Neva-Clog" (magnified to show flow); perforated sheet metal filter medium.



"Micromesh" (magnified) ultra-fine filter cloth; retention—25 to 10 microns.

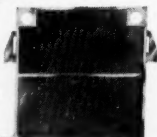
"Rim-Lok" leaf for vertical or horizontal filters.



"Sweetland" filter leaf.



"Multi-Plate" fabricated filter press plate.



Elements for gas stripping process.



Vibrating screen disc.



### SHOW DIRECTORY . . .

Yuba Consolidated Industries, Inc. . . . . 882-884-886

### ALCOHOL

\*Allied Chemical Corp. . . . . 955-957-959-961  
Continental Oil Co. . . . . 930  
Quaker Oats Company, Chemical Div. . . . . 953  
Scientific Glass Apparatus Co., Inc. . . . . 332

### ALKALIS

\*Allied Chemical Corp. . . . . 955-957-959-961  
Scientific Glass Apparatus Co., Inc. . . . . 332  
U. S. Borax & Chemical Corp. . . . . 918-920

### ALLOYS, FERROUS

Bishop & Co., J., Platinum Works 900-902  
\*Cooper Alloy Corp. . . . . 103  
Crucible Steel Co. of America. 1424-1426-1428  
\*Duriron Co., Inc. . . . . 520 & 532  
General Alloys Co. . . . . 193  
Lebanon Steel Co. . . . . 20  
National-U. S. Radiator Corp. . . . . 850  
National Tube Div., United States Steel Corp. . . . . 590  
Plastic Metals Div., National-U. S. Radiator Corp. . . . . 850  
Republic Steel Corp. . . . . 68  
Titanium Alloy Mfg. Div., National Lead Co. . . . . 234  
\*Tube Turns Div. of Chemetron Corp. . . . . 98  
Union Steel Corp. . . . . 840  
\*Waukesha Foundry Co. . . . . 1387-1389  
\*Westinghouse Electric Corp. . . . . 510

### ALLOYS, NON-FERROUS

\*Aluminum Company of America. 559  
Ampco Metal, Inc. . . . . 412  
Bishop & Co., Platinum Works, J. 900-902  
Cobalt Information Center, c/o Battelle Memorial Institute. 1415  
Crucible Steel Co. of America. 1424-1426-1428  
Engelhard Industries, Inc. . . . . 192-196  
\*Fansteel Metallurgical Corp. . . . . 617  
\*Haynes Stellite Co., Div. of Union Carbide Corp. . . . . 460-470  
Knapp Mills, Inc. . . . . 175  
Lead Industries Assn. . . . . 816  
Mallory-Sharon Metals Corp. . . . . 1133-1135  
Titanium Alloy Mfg. Div., National Lead Co. . . . . 234  
\*Tube Turns Div. of Chemetron Corp. . . . . 98  
Waukesha Foundry Co. . . . . 1387-1389  
\*Westinghouse Electric Corp. . . . . 510

### ANALYZERS

Beckman Instruments, Inc., Scientific & Process Instruments Div. 333  
Coulter Industrial Sales Co. . . . . 1444  
Engelhard Industries, Inc. . . . . 192-196  
Gow-Mac Instrument Co. . . . . 1246  
Industrial Nucleonics Corp. . . . . 1418-1420  
Milton Roy Co. . . . . 610  
Mine Safety Appliances Co. . . . . 14-16

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Perkin-Elmer Corp. ....386  
Pfaudler Permutit, Inc. ....110 & 141  
Podbielniak, Inc. ....595  
Scientific Glass Apparatus Co.,  
Inc. ....332  
Sticht Co., Inc., Herman H. ....1280  
Technicon Controls, Inc. ....316

#### ANODES

\*Aluminum Company of America.559  
Bishop & Co., Platinum Works, J.  
900-902  
\*Duriron Co., Inc. ....520-532  
Engelhard Industries, Inc. ....192-196  
Great Lakes Carbon Corp., Dica-  
lite Dept., Electrode Div. ....204  
Heil Process Equipment Corp. ....1305  
International Nickel Co., Inc. ....509  
Knapp Mills, Inc. ....175  
Lead Industries Assn. ....816  
\*Metals & Controls Div., Texas In-  
struments, Inc. ....1094  
\*National Carbon Co. ....460-470  
\*U. S. Stoneware Co. ....111  
Wallace & Tiernan Inc. ....686

#### ASBESTOS

Alsop Engineering Corp. ....381  
Carey Mfg. Co., Philip. ....1152  
\*Garlock Packing Co. ....415  
Hercules Filter Corp. ....213  
Keasbey & Mattison Co. ....822  
Miller Products Co., Inc. ....1091  
\*Raybestos-Manhattan, Inc. ....820  
Scientific Glass Apparatus Co.,  
Inc. ....332

#### AUTOCLAVES

American Instrument Co., Inc. ....445  
American Sterilizer Co. ....366  
\*Artisan Metal Products. ....874  
Autoclave Engineers Sales Corp. ....346  
Barnstead Still and Sterilizer Co. ....416  
Bartlett & Snow Co., C. O. ....569  
Beckley Haltom & Hickman. ....1342-  
1363  
Blaw-Knox Co. ....581  
Chicago Bridge & Iron Co. ....844  
\*Devine Mfg. Co., J. P. ....1372  
\*Fansteel Metallurgical Corp. ....617  
General Alloys Co. ....193  
General Laboratory Supply Co. ....310  
Glascote Products, Inc. ....596  
High Pressure Equipment Co.,  
Inc. ....1215-1217  
Hospital Supply Co., Inc. ....975  
Knapp Mills, Inc. ....175  
Koven Fabricators, Inc. ....74  
Mazzoni, S. P. A., G. ....1412  
New York Laboratory Supply Co.,  
Inc. ....1022  
North-Erie and American Process  
Equipment Div., National-U. S.  
Radiator Corp. ....850  
Pfaudler Permutit, Inc. ....110 & 141  
Posey Iron Works, Inc. ....1407  
Pressure Products Industries, Inc.  
1367-1369  
Scientific Glass Apparatus Co.,  
Inc. ....332  
Star Tank & Filter Corp. ....233  
Tenso-Lab., Inc. ....1123  
U. S. Mixers, Div. of Stockdale  
Engineering Co. ....1237  
Wilmot Castle Co. ....1033

#### AUTOMATIC TEMPERATURE CONTROL

\*Bailey Meter Co. ....46  
\*Barber-Colman Co., Wheelco In-  
struments Div. ....395  
Bragar Co., Inc., Norman. 1230-1232  
Burling Instrument Co. ....9  
\*Eclipse Fuel Engineering Co. ....973

Edison Industries, T. A., Instru-  
ment Div., McGraw-Edison Co. ....945  
Fenwal Inc. ....890-892  
Fischer & Porter Co. ....496  
\*Foxboro Co. ....519  
\*Frick Co. ....1258-1260  
\*Fulton Sylphon Div., Robertshaw-  
Fulton Controls Co. ....1293  
General Laboratory Supply Co. ....310  
Leslie Co. ....1333  
\*Minneapolis-Honeywell Regulator  
Co. ....635  
Precision Thermometer & Instru-  
ment Co. ....1401  
Radiation Electronics Co., Div. of  
Comptometer Corp. ....1155-1157  
\*Sarco Co., Inc. ....93  
Scientific Glass Apparatus Co.,  
Inc. ....332  
\*Taylor Instrument Companies. ....104  
\*Thermo Electric Co., Inc. ....817  
Trerice Co., H. O. ....1287

#### BAGS

Bel-Art Products ....889  
Bemis Bros. Bag Co. ....166-164  
\*Eimco Corp. ....80  
Union Bag-Camp Paper Corp. ....1296-  
1298

#### BALANCES AND WEIGHTS

American Instrument Co., Inc. ....445  
Exact Weight Scale Co. ....21  
General Laboratory Supply Co. ....310  
Mettler Instrument Corp. ....339  
New York Laboratory Supply Co.,  
Inc. ....1022  
Scientific Glass Apparatus Co.,  
Inc. ....332  
Tenso-Lab., Inc. ....1123  
Torsion Balance Co. ....328  
Welch Mfg. Co., W. M. ....205

#### BARRELS, DRUMS AND KEGS

\*Aluminum Company of America.559  
Associated Cooperage Industries  
of America, Inc. ....898  
Bel-Art Products ....889  
Binder Cooperage Co., Inc. ....1127  
Continental Can Co., Fibre Drum  
& Corrugated Box Div. ....899-901-  
903  
Delaware Barrel & Drum Co.,  
Inc. ....1187-1189-1193  
\*Du Verre, Inc. ....891  
Greif Bros. Cooperage Corp. ....41  
Norcross Companies, Sterling E. ....991  
Package Research Laboratory. ....1261-  
1263  
Pressed Steel Tank Co. ....631  
Terriss Div., Consolidated Siphon  
Supply Co., Inc. ....1329-1331

#### BASKETS, DIPPING

General Alloys Co. ....193  
Knight Co., Maurice A. ....586  
Lee Metal Products Co., Inc. ....1384  
Miller Products Co., Inc. ....1091  
\*Multi-Metal Wire Cloth Co., Inc. ....191  
Newark Wire Cloth Co. ....183  
\*Protectoseal Co. ....1286  
\*Tyler Co., W. S. ....574  
\*U. S. Stoneware Co. ....111

#### BEARINGS

Bartlett & Snow Co., C. O. ....569  
Chain Belt Co. ....1416  
\*Crane Packing Co. ....906  
Ethylene Corp. ....971

## DOES YOUR MIXING EQUIPMENT MEET THESE STANDARDS

?

- ☐ Ease in maintenance through simplicity of design
- ☐ Durability because of stellite faced stator and rotor
- ☐ Precision control affording correct clearances down to the smallest particle size
- ☐ Maximum shearing surfaces of rotor and stator achieve highest dispersion rate in minimum time



COLLOID MILL



... and only PREMIER  
OFFERS ALL THESE  
FEATURES... RESULT-  
ING IN... INCREASED  
PRODUCTION... LOWER  
COSTS!

Visit us at the Chemical Indus-  
tries Show, N. Y. Coliseum Nov. 30 to Dec. 4,  
Booth 1391

**PREMIER MILL CORP.**  
224 C Fifth Ave., New York 1, N.Y.

# COMPARE . . .

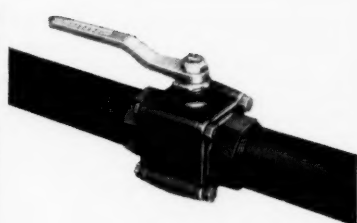
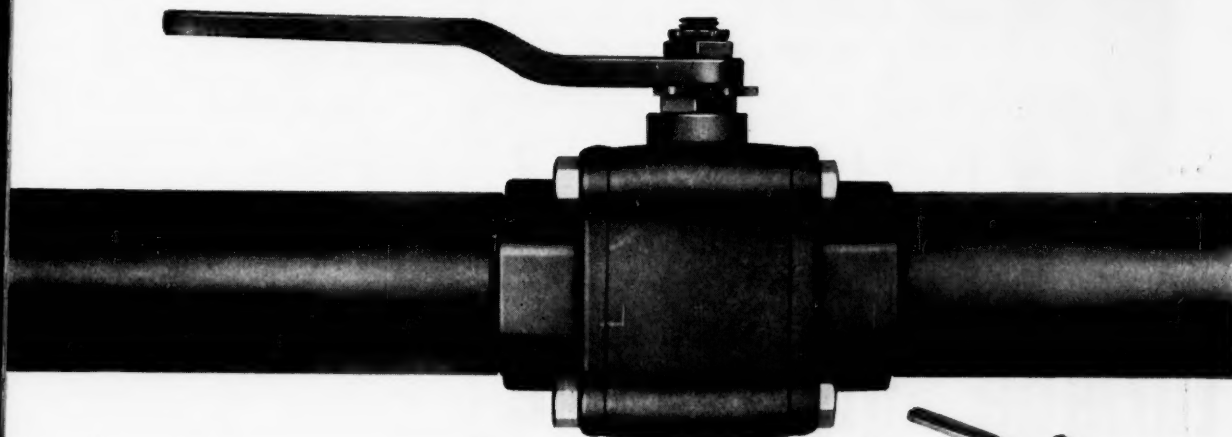
	ECON-O-MISER	GATE VALVE	FLANGED GATE VALVE	DIAPHRAGM VALVE	LUBRICATED PLUG VALVE
FLOW CHARACTERISTICS	 Smooth round flow	 Turbulence results in excessive pressure drop	 Turbulence results in excessive pressure drop	 Turbulence results in unusually high pressure drop	 Constricted flow . . . pressure drop
METHOD OF CLOSURE	 CLOSED 1/4 turn operation OPEN	 2 1/2 to 3 1/2 turns of hand wheel	 2 1/2 to 7 turns of hand wheel	 2 1/2 to 3 1/2 turns of hand wheel	 1/4 turn operation
MAINTENANCE REQUIREMENTS	 Seats and "O" Rings easily replaced	 Valve normally thrown away	 30% to 50% of purchase price	 In-line maintenance possible	 Regular lubrication necessary to maintain seal
VALVE SIZE	 CENTER TO TOP—OPEN 3 1/16"	 12 3/4"	 16 1/2"	 7 1/2"	 10 1/2"
VALVE LIFE	 Half million cycles not unusual	 Metal-to-metal seating limits life	 Metal-to-metal seating limits life	 Better than gate valve	 Very good if lubricated regularly

**THE ECON-O-MISER BALL VALVE  
IS THE IDEAL REPLACEMENT  
ON-OFF VALVES NOW IN  
PROCESS INDUSTRY**

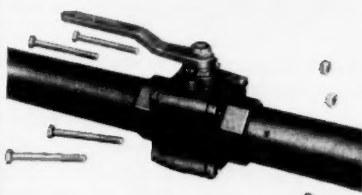
**MORE EFFICIENT . . . LESS COSTLY**



# THE ECON-O-MISER BALL VALVE



Compact, efficient ECON-O-MISER Ball Valves are today's smoothest operating on-off valves. A quarter turn of the handle allows full operation and you can tell at a glance whether the valve is open or closed. More... ECON-O-MISER Ball Valves act as both valve and union... eliminate costly inventory and labor. Minimum turbulence and greater economy make this valve ideal for hundreds of applications.



Remove four nuts... four bolts... and the entire center section lifts out for servicing. Quick, convenient maintenance saves money and this unique design means pipe ends never have to be removed from the line. Seating surfaces and O-Rings are easily replaced... whole valve back in operation in minutes. Reduces inventory expenses and frees maintenance personnel from time consuming repairs.



The ECON-O-MISER Ball Valve is available in many combinations of seats, O-Rings and body materials. Almost any media can be handled by the ECON-O-MISER and sizes range from 1/4" through 6". Made of bronze, aluminum, carbon steel, stainless steel or aluminum bronze. We'll be happy to furnish information or application data.



Complete, technical information in new "Comparison" bulletin.

Request EB 101 on your letterhead or fill in coupon.

**THE ONLY VALVE IN INDUSTRY THAT SERVES AS BOTH VALVE AND UNION!**

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

☐ Please forward bulletin EB 101. ☐ Please ask sales engineer to call for appointment. ☐ Send information on ECON-O-MISER FLANGE BALL VALVE.



**WORCESTER VALVE CO., INC.**  
DEPT. A • 16 PARKER STREET • WORCESTER, MASS.



moduflex<sup>TM</sup> line: over a hundred sizes and styles

# NEW

## turbine agitator line

Chemineer, Inc., presents the Moduflex line — the first new approach to turbine agitator design in 15 years. If you judge agitator performance in dollars, check these outstanding advantages:

1. Moduflex inventoried components let you specify exactly the turbine agitator you need—and give you prompt delivery at standard, competitive prices. Because parts are modular, unanticipated changes are easily made to meet new requirements.
2. Moduflex turbine agitator drives give you the advantages of the most advanced concepts in reliable machine design. Gear teeth are ground after hardening for extremely quiet operation — splined shafts hold change gears — short bearing span and large diameter shafting prevents harmful dynamic deflection. You can use a Moduflex agitator in many applications formerly requiring steady bearings.
3. Moduflex turbine agitators perform the job for which they are recommended or you get your money back. To see why leaders in the CPI are buying Moduflex turbine agitators, request technical Bulletin M-200 now. Chemineer, Inc., 1044 East First Street, Dayton 2, Ohio. Telephone BAldwin 2-8361.

Moduflex turbine agitators use inventoried modular components to form 5 basic drive styles: right angle head, belt drive, in-line with coupled motor, in-line with integral motor, and variable speed. Drives are inventoried in 7 case sizes with 17 AGMA gear ratios in each size. Mounting options: open tank flange, closed tank flange with stuffing box or mechanical seal. Motors: 1 through 75 hp, any specs. Choice of impellers, wetted parts.

**CHEMINEER, INC.**

CHEM SHOW  
BOOTH 1220

### SHOW DIRECTORY . . .

- \*Haynes Stellite Co., Div. of Union Carbide Corp. ....460-470
- Link-Belt Co. ....165
- Pennsylvania Fluorocarbon Co., Inc. ....969
- \*Raybestos-Manhattan, Inc. ....820
- \*Westinghouse Electric Corp. ....510

### BELTS

- General Alloys Co. ....193
- General Plastics Corp. ....967
- Mine Safety Appliance Co. ....14-16
- Welch Mfg. Co., W. M. ....205
- Worthington Corp. ....545

### BLAST EQUIPMENT

- \*Pangborn Corp. ....681
- Wheelabrator Corp. ....190

### BLENDERS

- Blaw-Knox Co. ....581
- Blickman, Inc., S. ....325
- Cleveland Mixer Co. ....1067-1069
- Colton Co., Arthur Div., Snyder Corp. ....50
- \*Day Co., J. H. Div., Cleveland Automatic Machine Co. ....121-122
- Fitzpatrick Co., W. J., & Fitzpatco Corp. ....64
- Gump Co., B. F. ....1024-1026
- Patterson Foundry & Machine Co. ....154
- \*Patterson-Kelley Co., Inc. ....188 & 215
- Road Standard, Div. of Capitol Products Corp. ....162
- \*Ross & Son Co., Inc., Charles. ....983-985
- \*Stokes Corp., F. J. ....38 & 67
- \*Sturtevant Mill Co. ....421
- Syntron Co. ....163

### BLOWERS

- \*Allis-Chalmers Mfg. Co. ....636
- Croll-Reynolds Co., Inc. ....1054
- Day Co., The. ....45
- De Bothesat Fans Div., American Machine and Metals, Inc. ....556
- \*Du Verre, Inc. ....891
- \*Fuller Co. ....446
- \*General American Transportation Corp. ....435-436-442-446-495
- Heil Process Equipment Corp. ....1305
- Industrial Plastic Fabricators, Inc. ....1102
- Ingersoll-Rand Co. ....128
- International Process Equipment Co., Inc. ....812
- Niagara Blower Co. ....655
- Schutte and Koerting Co. ....61
- U. S. Hoffman Machinery Corp. ....1365
- \*Westinghouse Electric Corp. ....510
- Young Machinery Co., Inc., The. ....1087

### BOILERS

- \*Eclipse Fuel Engineering Co. ....973
- National-U. S. Radiator Corp. ....850
- \*Vogt Machine Co., Henry. ....124

### BOILER COVERING AND INSULATION

- \*Aluminum Company of America. ....559
- Carey Mfg. Co., Philip. ....1152
- Eagle-Picher Co. ....1167-1169
- Harbison-Walker Refractories Co. ....1241-1243

### BOLTING CLOTH

- Buffalo Wire Works Co., Inc. ....1381
- Great Western Mfg. Co. ....216
- Gump Co., B. F. ....1024-1026

Lehmann Co., Inc., J. M.....	1429-1431-1446
*Multi-Metal Wire Cloth Co., Inc.	191
Newark Wire Cloth Co.....	183
Simon-Carter Co.....	1096
Southwestern Engineering Co.	1250-1252

#### BOTTLING MACHINERY

Cherry-Burrell Corp. ....	1039-1045-1049
Namco Machinery, Inc.....	365
Pfaudler Permutit, Inc.....	110-141
Terriss Div., Consolidated Siphon Supply Co., Inc.....	1329-1331

#### BRICK, ACID PROOF

Harbison-Walker Refractories Co.	1241-1243
Knapp Mills, Inc. ....	175
Knight Co., Maurice A.....	586
*National Carbon Co.....	460-470
Nukem Products Corp.....	1072
*U. S. Stoneware Co.....	111

#### BRICK, INSULATING

Harbison-Walker Refractories Co.	1241-1243
*Norton Co. ....	1289-1291
Titanium Alloy Mfg. Div., National Lead Co.....	234

#### BRICK REFRACTORY

Harbison-Walker Refractories Co.	1241-1243
*National Carbon Co.....	468-470
*Norton Co. ....	1289-1291
Titanium Alloy Mfg. Div., National Lead Co.....	234

#### BRIQUETTING AND TABLET MAKING MACHINERY

California Pellet Mill Co.....	1360
Carver, Inc., Fred S.....	90
Colton Co., Arthur Div. Snyder Corp. ....	50
Fitzpatrick Co., W. J. & The Fitzpatco Corp. ....	64
International Process Equipment Co., Inc. ....	812
Stokes Corp., F. J.....	38 & 67

#### BUCKETS, ELEVATOR

Bartlett & Snow Co., C. O.....	569
Bucket Elevator Co. ....	1038
Gifford Wood Co.....	219
Great Western Mfg. Co.....	216
Howes Co., Inc., S.....	1029
*Jeffrey Mfg. Co.....	97
*Kennedy-Van Saun Mfg. & Engr. Corp. ....	1036
Link-Belt Co. ....	165
M-H Standard Corp.....	997
Rapids Machinery Co., Inc.....	1162
Renneburg & Sons Co., Edw.....	1078

#### BUILDING MATERIALS

*Allied Chemical Corp.....	955-957-959-961
Carey Mfg. Co., Philip.....	1152
Lead Industries Assn.....	816
M-H Standard Corp.....	997

#### BURNERS

American Gas Furnace Co.....	833
Carlisle Gas Burner Corp.....	1251
Eclipse Fuel Engineering Co.....	973

*General American Transportation Corp. ....	435-436-442-446-495
National-U. S. Radiator Corp....	850
Peabody Engineering Corp....	1321
Precision Scientific Co.....	370-372
Renneburg & Sons Co., Edw.....	1078
Schutte and Koerting Co.....	61
*Selas Corp. of America.....	979-981
Welch Mfg. Co., W. M.....	205

#### CABINETS—CHEMICAL, FILING AND LABORATORY

Blickman, Inc., S.....	325
Browne-Morse Co. ....	1359
*Duralab Equipment Corp.....	359
Kewaunee Mfg. Co.....	398
Laboratory Furniture Co.....	309
Metalab Equipment Corp. Div. of Norbute Corp. ....	356
*Protectoseal Co. ....	1286
*Renneburg & Sons Co., Edw.....	1078
*Republic Steel Corp.....	68
Scientific Glass Apparatus Co., Inc. ....	332

#### CALCINERS

American Gas Furnace Co.....	833
Bartlett & Snow Co., C. O.....	569
*Bowen Engineering, Inc.....	706
*Dorr-Oliver Inc.....	531
*General American Transportation Corp. ....	435-436-442-446-495
*Kennedy-Van Saun Mfg. & Engrg. Corp. ....	1036
Nichols Engineering & Research Corp. ....	624
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. ....	850
Posey Iron Works, Inc.....	1407
*Renneburg & Sons Co., Edw.....	1078
*Standard Steel Corp.....	153

#### CALORIMETERS

New York Laboratory Supply Co., Inc. ....	1022
Scientific Glass Apparatus Co., Inc. ....	332
Tenso-Lab., Inc. ....	1123
Terriss Div., Consolidated Siphon Supply Co., Inc.....	1329-1331
Welch Mfg. Co., W. M.....	205

#### CANS

*Protectoseal Co. ....	1286
Terriss Div., Consolidated Siphon Supply Co., Inc.....	1329-1331

#### CARBON

*Barnebey-Cheney Co. ....	52
Falls Industries, Inc.....	131
Filtros Inc. ....	854-856
Great Lakes Carbon Corp. Dicalite Dept. Electrode Div.....	204
*National Carbon Co.....	460-470
Quaker Oats Co., Chemicals Div..	953
West Virginia Pulp and Paper Co., Industrial Chemical Sales Div. ....	924-926

#### CARBOY FILTERS

Nalge Co., Inc.....	1201
Scientific Glass Apparatus Co., Inc. ....	332
United Box & Lumber Co.....	1085

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



## FAMOUS CHEMICAL REFERENCE

Now Greatly Expanded  
in Size and Scope

The first new edition of THE MERCK INDEX in seven years is now on press. Published on a nonprofit basis to serve the professions, it is completely updated, increased in size, and expanded by 2,300 new chemical monographs. New cross-indexing quickly leads you to concise information on any given substance—regardless of whether you look it up under brand, generic, or systematic chemical name. Send reservation certificate now to receive your copy immediately on publication early in 1960.

Luxuriously bound • Now contains approximately 1600 pages

RESERVATION CERTIFICATE	
Merck & Co., Inc., Rahway, New Jersey	Dept. CE-9
I wish to receive the new MERCK INDEX (Seventh Edition) immediately upon publication. Kindly reserve a copy in my name at pre-publication price of \$11.00.	
...Check enclosed... Bill me for price of book plus 40¢ handling charge.	
Name.....	
Address.....	
City.....	
Zone..... State.....	
OFFER LIMITED TO PROMPT ACCEPTANCE	

## AUTHOR

**TALITARIAN.** — n. One who  
**tar'i-an-ism** (tār'i-tār'i-ān  
**au-thor'i-ta-tive** (ō-thōr'i-tā-ti  
 from, authority; entitled to ob  
 thoritative teachings. 2. Ha  
 peremptory. — **au-thor'i-ta-tiv**  
**au-thor'i-ty** (ō-thōr'i-tē), n.; p  
 auctoritas. 1. Legal or fish  
 a particular field; as, the Port  
 of New York. 2. Power; —  
 used to, in support of opinio  
 on; witness. b A prec  
 A book or treatise. d Just  
 PUBLISHING STAFF  
 THAN ALL OTHER  
 like. — **Syn.**  
 auctorization (ō-thōr-i-zā-shū.  
**CHEMICAL PROCESS**  
**INDUSTRIES** (ō-thēr-iz), v. t. 1  
 to commission; as, autho  
 technical sanction; as, customs  
**PUT TOGETHER** and for. — **au-th**  
**thor-ized** (ō-thēr-izd), adj. 1  
 authority. b Sanctioned or approved

## Chemical Engineering



McGraw Hill Building,  
 New York 36, N. Y.



Published every other Monday for  
 Chemical Engineers in all functions



IT CLEANS QUIETLY, WITHOUT RAISING DUST.  
 IT'S A NEW . . .

## VON ARX AIR GUN De-Rusting, De-Scaling

Operating on compressed air, this light-weight pistol is a handy tool for de-rusting, de-scaling, cleaning, and preparing surfaces of practically all materials. The tool excels for cleaning uneven surfaces—hard-to-reach crevices, niches, or grooves. It effectively cleans hard surfaces such as steel, stone, or concrete—even cleans resinous coatings. It's fine for cleaning weld seams, for paint stripping, for raking joints, for rough-up jobs. Shown above, it's performing a wall-cleaning job on concrete.

Here's how it works:

Compressed air from any compressor hammers the hardened steel needles so that they pound the contour of the surface being cleaned—thus rapidly removing scale and rust from even the most inaccessible points.

Pistol comes in three models, largest of which weighs 13 lb. Three sizes of needles in two styles (chisel point and flat head) are offered for varied jobs.

**THE MARINDUS CO., INC.**  
 51 PINE ST., NEW YORK 5, N. Y.

## SHOW DIRECTORY . . .

### CARS

\*General American Transportation  
 Corp. . . . . 435-436-442-446-495

### CASTINGS

Ampeco Metal, Inc. . . . . 412  
 \*Crane Co. . . . . 422  
 Curtiss-Wright Corp., Metals  
 Processing Div. . . . . 1344-1346  
 \*Duriron Co., Inc. . . . . 520-532  
 General Alloys Co. . . . . 193  
 \*General American Transportation  
 Corp. . . . . 435-436-442-446-495  
 \*Grinnell Co., Inc. . . . . 566  
 \*Haynes Stellite Co., Div. of Union  
 Carbide Corp. . . . . 460-470  
 \*Kennedy-Van Saun Mfg. &  
 Engrg. Corp. . . . . 1036  
 Knapp Mills, Inc. . . . . 175  
 Lebanon Steel Foundry . . . . . 20  
 \*Link Belt Co. . . . . 165  
 Posey Iron Works, Inc. . . . . 1407  
 \*Waukesha Foundry Co. . . . . 1387-1389

### CATALYSTS

\*Aluminum Company of America . . . . . 559  
 \*Allied Chemical Corp. . . . . 955-957-  
 959-961  
 \*Barnebey-Cheney Co. . . . . 52  
 Catalytic Combustion Corp. . . . . 1209  
 Eagle-Picher Co. . . . . 1167-1169  
 Engelhard Industries, Inc. . . . . 192-196  
 Filtros Inc. . . . . 854-856  
 Minerals & Chemicals Corp. of  
 America . . . . . 950  
 Oxy-Catalyst, Inc. . . . . 1349-1343-45-47  
 National-U. S. Radiator Corp. . . . . 850  
 \*Norton Co. . . . . 1289-1291  
 Plastic Metals Div., National-U.  
 S. Radiator Corp. . . . . 850  
 \*Wallace & Tiernan Inc. . . . . 686

### CELLULOSE

Brown Co. . . . . 923  
 \*Hercules Powder Co. . . . . 916  
 Quaker Oats Co., Chemicals Div. . . . . 953

### CEMENT

Aluminum Company of America . . . . . 559  
 Carey Mfg. Co., Philip . . . . . 1152  
 Eagle-Picher Co. . . . . 1167-1169  
 Fibercast Co. Div., Youngstown  
 Sheet & Tube Co. . . . . 870  
 Harbison-Walker Refractories Co.  
 1241-1243  
 \*Haveg Industries, Inc. . . . . 546  
 Knight Co., Maurice A. . . . . 586  
 \*National Carbon Co. . . . . 460-470  
 Nukem Products Corp. . . . . 1072  
 Thermon Mfg. Co. . . . . 1207  
 \*Tube Turns Plastics, Inc. . . . . 96  
 U. S. Stoneware Co., The . . . . . 111

### CENTRIFUGALS

Alsop Engineering Corp. . . . . 381  
 American Tool and Machine Co. . . . . 862  
 \*Artisan Metal Products . . . . . 874  
 \*Baker Perkins, Inc. . . . . 560 & 609  
 \*Bird Machine Co. . . . . 685  
 \*Centrico, Inc. . . . . 842  
 De Laval Separator Co. . . . . 94  
 \*Dorr-Oliver Inc. . . . . 531  
 Entoleter Div., Safety Industries,  
 Inc. . . . . 1599  
 General Laboratory Supply Co. . . . . 310  
 Miller Products Co. Inc. . . . . 1091  
 \*Pfaudler Permutit, Inc. . . . . 110 & 141

\*For additional information see advertise-  
 ment in this issue and use your Reader Service  
 postcard, p. 247.

Podbielniak, Inc. . . . . 595  
 Renneburg & Sons Co., Edw. . . . . 1078  
 \*Sharples Corp. . . . . 485  
 Scientific Glass Apparatus Co.,  
 Inc. . . . . 332  
 Sorvall, Inc., Ivan . . . . . 342  
 Tenso-Lab, Inc. . . . . 1123  
 \*TolhurstCentrifugals Div., Amer-  
 ican Machine and Metals, Inc. . . . . 506  
 Welch Mfg. Co., W. M. . . . . 205  
 Western States Machine Co. . . . . 1168-  
 1170-1172

### CERAMICS

Filtros Inc. . . . . 854-856  
 General Ceramics Corp. . . . . 131  
 Great Western Mfg. Co. . . . . 216  
 Knight Co., Maurice A. . . . . 586  
 Laboratory Equipment Corp. . . . . 905  
 Lead Industries Assn. . . . . 816  
 \*Norton Co. . . . . 1289-1291  
 Porcelain Div., Ferro Corp. . . . . 154  
 Titanium Alloy Mfg. Div., Na-  
 tional Lead Co. . . . . 234  
 U. S. Stoneware Co. . . . . 111

### CHEMICAL PLANT EQUIPMENT

\*Adams Co., Inc., R. P. . . . . 836  
 \*Allis-Chalmers Mfg. Co. . . . . 636  
 Alsop Engineering Corp. . . . . 381  
 American Meter Co., Inc., Pump  
 Div. . . . . 150  
 American Plant Equipment Co. . . . . 1282-  
 1284  
 American Tool & Machine Co. . . . . 862  
 \*Artisan Metal Products . . . . . 874  
 B-I-F Industries, Inc. . . . . 660  
 Bartlett & Snow Co., C. O. . . . . 569  
 Blaw-Knox Co. . . . . 581  
 Blickman, Inc., S. . . . . 325  
 Brown & Co., J. G. . . . . 1093  
 Bucket Elevator Co. . . . . 1038  
 Carbone Corp. . . . . 803  
 \*Carrier Conveyor Corp. . . . . 127  
 Carver, Inc., Fred S. . . . . 90  
 Centrifix Corp. . . . . 1180  
 \*Chemicolloid Laboratories, Inc. . . . . 618  
 \*Cherry-Burrell Corp. . . . . 1039-1045-  
 1049  
 Cleveland Mixer Co. . . . . 1067-1069  
 Colton Co., Arthur Div., Snyder  
 Corp. . . . . 50  
 Cornell Machine Co. . . . . 1212  
 \*Corning Glass Works . . . . . 134  
 Coulter Industrial Sales Co. . . . . 1444  
 \*Day Co., J. H. Div., Cleveland  
 Automatic Machine Co. . . . . 121-122  
 \*Dean Brothers Pumps, Inc. . . . . 1245-  
 1247-1249  
 Dean Products, Inc. . . . . 184  
 Delaware Barrel & Drum Co. Inc.  
 1187-1189-1193  
 Distillation Engineering Co. . . . . 1048  
 \*Dorr-Oliver Inc. . . . . 531  
 Dowtown Iron Works Inc., Div.  
 Pressed Steel Tank Co. . . . . 631  
 \*Du Verre, Inc. . . . . 891  
 Eimco Corp. . . . . 80  
 Engelhard Industries, Inc. . . . . 192-196  
 Entoleter Div., Safety Industries,  
 Inc. . . . . 1599  
 Denver Equipment Co. . . . . 1146  
 Falls Industries, Inc. . . . . 131  
 \*Fasteel Metallurgical Corp. . . . . 617  
 Fitzpatrick Co., W. J., & The Fitz-  
 patco Corp. . . . . 64  
 \*Fluid Energy Processing & Equip-  
 ment Co. . . . . 813  
 Fuller Co. . . . . 446

Code number for  
 this advertisement  
 315-318 ➔



## EQUIPMENT DEVELOPED AND MANUFACTURED

BY...

**Strong**

## FOR MODERN METHODS AND TECHNIQUES OF MIXING, BLENDING AND PARTICLE SIZE REDUCTION ...

For over 60 years, The Strong-Scott Mfg. Co. has furnished industry with equipment engineered to meet high efficiency processing requirements. The background, experience and ability of our engineers combined with the craftsmanship of our production personnel assure you of well built, well engineered equipment that always delivers top performance. We are proud to have earned this reputation.

### CHEMICALS



### FOODS



### PROPELLENTS



### See these Units Displayed

Booths 1274-1276-1278  
27th Exposition of  
Chemical Industries  
Nov. 30 to Dec. 4, 1959

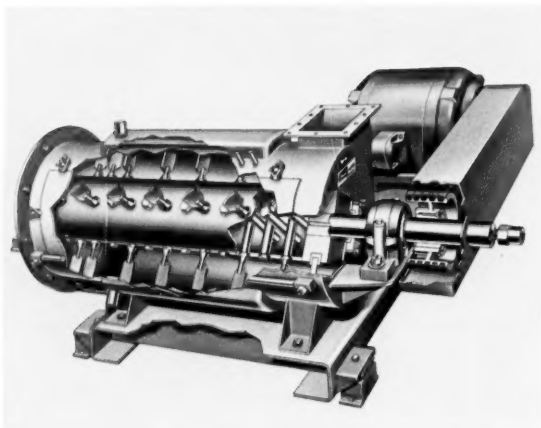
Through more than a half century of  
Research and Development

**Strong**

451 Taft Street N.E., Minneapolis 13, Minnesota

EQUIPMENT DESIGNED FOR BETTER PROCESSING

## FOR DISPERSION...**TURBULIZER®**



Provides an easy, positive, economical method of intimate dispersion (solids and semi-solids) and kneading (viscous, pasty materials) on a continuous basis. The operating principle, labeled "Turbulizing," combines turbulent, shear and impact action. Special features allow great versatility in application. Angle of paddles and peripheral speed are adjustable to control "Turbulizing" action. Jacketing of mixing chamber plus hollow rotor shaft for heat transfer medium permit control of temperature of ingredients. A hinged cover door, which is an integral part of the mixing shell, provides quick accessibility to chamber. The TURBULIZER is compact for easy installation, clean and dustless for sanitary operation. Available in either 14 or 20 in. shell diameter in portable or stationary designs. Constructed of carbon or stainless steel.

## FOR BLENDING...**RIBBON BLENDER**

**SEE THESE  
UNITS  
DISPLAYED**

Booths 1274-1276-1278

27th Exposition of  
Chemical Industries

Nov. 30 to Dec. 4, 1959



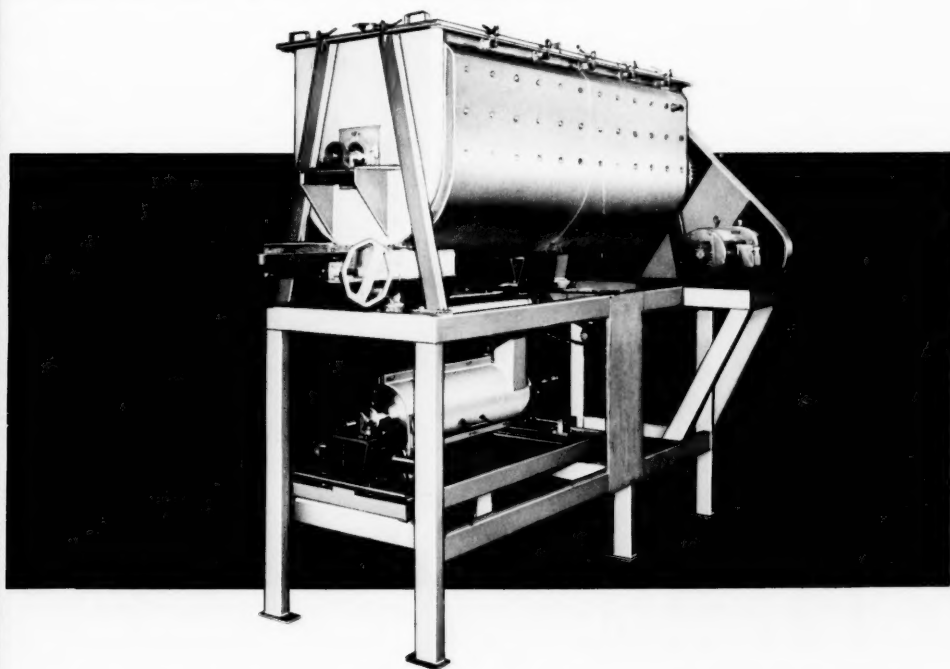
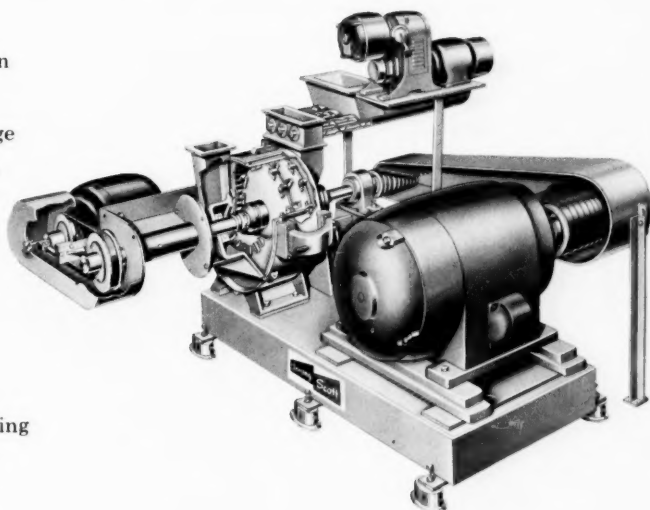
Ideal for accurately blending small amounts of critical ingredients with a large basic material, in a minimum amount of time. The Strong-Scott INDUSTRIAL RIBBON BLENDER was especially designed to meet sanitary codes. Peak mixing efficiency controls quality of product. Simple operation and maintenance requirements lower your production costs. Units available in nine sizes from 16 to 300 cubic foot working capacities. Constructed of either carbon steel or stainless steel.

**Strong**

**Scott**

# PULVOCRON®...FOR SIZE REDUCTION

An impact and air attrition pulverizer combined with an integral particle size classifier. Extremely versatile, the PULVOCRON produces a product in the very fine range of 95 to 99% less than 5 to 10 microns, or in the coarse range of 60 mesh. Products that the PULVOCRON will process vary from those of extreme hardness to fluffy softness. The Pulvocron features easily adjusted, particle size control . . . pulverized product temperature control . . . quick accessibility for inspection and sturdy construction for years of service. Available in two sizes—20 in. and 38 in. diameter grinding chamber. Constructed of carbon steel or stainless steel.



## SEE THESE UNITS DISPLAYED

Booths 1274-1276-1278  
27th Exposition of  
Chemical Industries  
Nov. 30 to Dec. 4, 1959

## COMBINED UNIT INSTALLATIONS ... a customized processing system

Strong-Scott engineers have developed various processing systems to solve particular problems. All Strong-Scott products are designed to function as integral parts of a system so that our engineers can combine various units to perform a particular process. Shown here is a Batch Compounding, Continuous Mixing (BCCM) System, utilizing a Strong-Scott Industrial Ribbon Blender and Turbulizer, that produces the ultimate end product to meet a particular need. Many systems developed by Strong-Scott Engineers are operating now in the process industries. Consult Strong-Scott with your processing problems.

**STRONG-SCOTT Manufactures a Complete Line of Processing Equipment.**

**See these Units Displayed**  
Booths 1274-1276-1278  
27th Exposition of  
Chemical Industries  
Nov. 30 to Dec. 4, 1959

Representative Equipment in the Strong-Scott Line Shown Below.

**MIXING AND BLENDING**

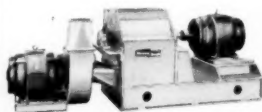
**SIZE REDUCTION**

**PARTICLE SIZE SEPARATION**

**MATERIALS HANDLING**



**Porta-Blend**



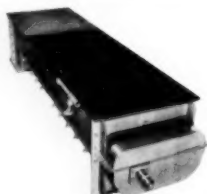
**Hammermill**



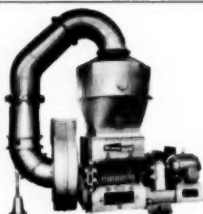
**Power-Flo**



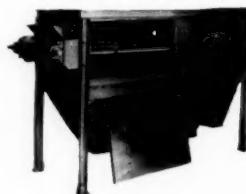
**Slider Belt Conveyor**



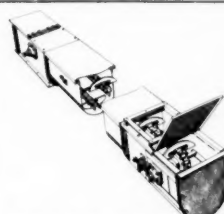
**Twin Rotor**



**Unit Pulverizer**



**Reel Scalper**



**Drag Plate Conveyor**



**PRODUCTION TESTING SERVICE**

Strong-Scott maintains a unique Production Testing Service with production sized mixing, size reduction and particle size separation equipment to solve your processing problems. Test runs under actual plant operating conditions pre-test the performance of Strong-Scott equipment. Results are accurately analyzed and made available only to the processor. Capacities and accuracy of the equipment are guaranteed. Many advanced production processes have been pioneered by this Production Testing Service. It is available to the process industries completely free of charge as a service to the industry.

**WRITE FOR COMPLETE INFORMATION on specific equipment or the Production Testing Service**

**THE Strong MFG. CO.**

451 TAFT ST. N.E., MINNEAPOLIS 13, MINN., PHONE: STerling 1-7461

**THERE IS A STRONG-SCOTT REPRESENTATIVE NEAR YOU**

**STRONG-SCOTT MFG. CO.**  
**EASTERN SALES OFFICE**  
151 East Front Street, P. O. Box 561, Red Bank, New Jersey

**BASS INDUSTRIAL EQUIPMENT**  
6045 Main Street, Buffalo 21, New York

**BASS INDUSTRIAL EQUIPMENT OF CANADA**  
241 Merton Street, Toronto, Ontario, Canada

**THE CHAVIGNY COMPANY**  
2200 Welch Street, Houston 19, Texas

**EMPIRE EQUIPMENT CORP.**  
385 East Green Street, Pasadena, California

**L. A. FAUNCE**  
18060 James Couzens Hy., Detroit 35, Michigan

**H. W. HENDRIX**  
235 Lancaster Avenue, Devon, Pennsylvania

**WILLIAM HUST**  
1031 N. Humphrey Avenue, Oak Park, Illinois

**REID-STRUTT CO. INC.**  
417 S. E. 11th Street, Portland, Oregon

**REID-STRUTT CO. INC.**  
2212 First Avenue South, Seattle, Washington

**REID-STRUTT CO. INC.**  
North B Lee Street, Spokane, Washington

**C. H. SPENCER & CO.**  
210 West 33rd South, Salt Lake City, Utah

**GEORGE H. TAFT**  
9 Monument Street, Concord, Massachusetts

**EXPORT REPRESENTATIVE**  
**EDWARD M. MELTON CO.**  
36 West 44th Street, New York 36, New York

**EQUIPMENT DESIGNED FOR BETTER PROCESSING**



# SHOW DIRECTORY . . .

*Fulton Sylphon Div., Robertshaw-Fulton Controls Co.	1293
General Alloys Co.	193
*General American Transportation Corp.	435-436-442-446-495
General Ceramics Corp.	131
Gifford-Wood Co.	219
Glascote Products, Inc.	596
Glengarry Processes, Inc.	60
Goodyear Pumps, Inc.	1341
Gump Co., B. F.	1024-1026
*Haveg Industries, Inc.	546
Heat Transfer Div., National-U. S. Radiator Corp.	850
Heil Process Equipment Corp.	1305
Hercules Filter Corp.	213
High Pressure Equipment Co., Inc.	1215-1217
Hockmeyer & Co., Herman.	1178
Howes Co., Inc., S.	1029
Hunt Machine Co., Rodney.	1240-1242-1244
Industrial Nucleonics Corp.	1418-1420
Industrial Plastic Fabricators, Inc.	1102
Industrial Products Engineering Co.	1259
International Process Equipment Co., Inc.	812
Jacoby-Tarbox Corp.	1362
*Jeffrey Mfg. Co.	97
*Kennedy-Van Saun Mfg. & Engrg. Corp.	1036
Knapp Mills, Inc.	175
Knight Co., Maurice A.	586
*Komline-Sanderson Engineering Corp.	1307-1309
Koven Fabricators, Inc.	74
Lawrence Pumps, Inc.	852
Lead Lined Iron Pipe Co.	70
Lee Metal Products Co., Inc.	1384
Lehmann Co., Inc., J. M.	1429-1431-1446
Link-Belt Co.	165
McIntosh Equipment Corp.	1343-45-47-49
*Manton-Gaulin Mfg. Co., Inc.	51
*Metal Cladding, Inc.	1378
Mazzoni, G., S. P. A.	1412
Mixing Equipment Co., Inc.	146
*Morehouse-Cowles, Inc.	814
Nalge Co., Inc.	1201
*National Carbon Co.	460-470
National-U. S. Radiator Corp.	850
*Nettco Corp.	79
*Nichols Engineering & Research Corp.	624
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp.	850
NoVo Div., Industrial Enterprises, Inc.	1030
Packed Column Corp.	1171
Patterson Foundry and Machine Co.	154
*Patterson-Kelley Co., Inc.	188 & 215
Peabody Engineering Corp.	1321
Pennsylvania Fluorocarbon Co., Inc.	969
*Pfauter Permutit, Inc.	110 & 141
Podbielniak, Inc.	595
Porter Inc., George K.	1134-1136
*Premier Mill Corp.	1391
Pressed Steel Tank Co.	631
Pressure Products Co.	1409
*Proctor & Schwartz, Inc.	684
Pulva Corp.	220
RKL Controls, Inc.	1405
Read Standard Div., Capitol Products Corp.	162
Renneburg & Sons Co., Edw.	1078

\*For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Research Controls	1186
*Resistoflex Corp.	893-895-897
Rietz Manufacturing Co.	1231
*Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div.	1366-1368
*Ross & Son Co., Inc., Charles	983-985
Schutte & Koerting Co.	61
Scientific Glass Apparatus Co., Inc.	332
*Sharples Corp.	485
Sier-Bath Gear & Pump Co., Inc.	806
Simon-Carter Co.	1096
Smith Co., T. L.	986
Sonic Engineering Corp.	1122
Southwestern Engineering Co.	1250-1252
*Sperry & Co., D. R.	1362
Stainless Products Corp.	1158
Star Tank & Filter Corp.	233
Stokes Corp., F. J.	38 & 67
*Strong, Carlisle & Hammond	1121
*Sturtevant Mill Co.	421
Syntron Co.	163
*Taylor Instrument Companies	104
Technicon Controls, Inc.	316
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
*Tolhurst Centrifugals Div., American Machine and Metals, Inc.	506
Tri-Homo Corp.	214
*Tube Turns, Div. of Chemetron Corp.	98
Tube Turns Plastics, Inc.	96
U. S. Mixers, Div. of Stockdale Engineering Co.	1237
*U. S. Stoneware Co.	111
Vac-U-Max	1195-1197
Vibra Screw Feeders, Inc.	1138-1142
Voss Co., Inc., J. H. H.	1224
Wilmot Castle Co.	1033
York Co., Inc., Otto H.	85
Yeomans Brothers Co.	1156
Young Machinery Co., Inc., The	1087
Young Radiator Co.	1403
Yuba Consolidated Industries, Inc.	882-884-886

## CHEMICAL STONWARE, ACID PROOF

*Duralab Equipment Corp.	359
General Ceramics Corp.	131
Knight Co., Maurice A.	586
New York Laboratory Supply Co., Inc.	1022
Scientific Glass Apparatus Co., Inc.	332

## CHEMICALS, INDUSTRIAL

*Allied Chemical Corp.	955-957-959-961
*Aluminum Company of America	559
Ansul Chemical Co.	95
Armour Industrial Chemical Co.	932-934
Bishop & Co., Platinum Works, J.	900-902
Chemo Puro Mfg. Co.	962
Cobalt Information Center c/o Battelle Memorial Institute	1415
Continental Oil Co.	930
*Enjay Co., Inc.	944-946-948
Frank Chemical Co., Inc., J. P.	921
*Hercules Powder Co.	916
Metal Hydrides Inc.	964
Metalsalts Corp.	933
Michigan Chemical Corp.	942
Minerals & Chemicals Corp. of America	950
National Rosin Oil Products, Inc.	917
Quaker Oats Co., Chemicals Div.	953
Scientific Glass Apparatus Co., Inc.	332
Titanium Alloy Mfg. Div., National Lead Co.	234

U. S. Borax & Chemical Corp.	918-920
Victor Chemical Works	936, 938, 940, 963
West Virginia Pulp & Paper Co., Industrial Chemical Sales Div.	924-926

## CHEMICALS, LABORATORY

*Allied Chemical Corp.	955-957-959-961
Ansul Chemical Co.	95
Bishop & Co., Platinum Works, J.	900-902
Engelhard Industries, Inc.	192-196
General Laboratory Supply Co.	310
Metal Hydrides Inc.	964
Metalsalts Corp.	933
Michigan Chemical Corp.	942
New York Laboratory Supply Co., Inc.	1022
Scientific Glass Apparatus Co., Inc.	332
Tenso-Lab, Inc.	1123
Welch Mfg. Co., W. M.	205

## CHEMICALS, PHARMACEUTICAL

*Allied Chemical Corp.	955-957-959-961
Ansul Chemical Co.	95
Bishop & Co., Platinum Works, J.	900-902
Chemo Puro Mfg. Co.	962
Engelhard Industries, Inc.	192-196
Metal Hydrides Incorporated	964
Metalsalts Corp.	933
Michigan Chemical Corp.	942
Minerals & Chemicals Corp. of America	950
Scientific Glass Apparatus Co., Inc.	332
Victor Chemical Works	936-938-940-963

## CHEMISTS

Allied Chemical Corp.	955-957-959-961
Laboratory Equipment Corp.	905

## CHLORINATORS

B-I-F Industries, Inc.	660
Cornell Machine Co.	1212
Fischer & Porter Co.	496
Glascote Products, Inc.	596
*National Carbon Co.	460-470
Norcross Companies, Sterling E.	991
*Wallace & Tiernan, Inc.	686

## CLARIFIERS

Alsop Engineering Corp.	381
American Tool & Machine Co.	862
*Bird Machine Co.	685
Brown & Co., J. G.	1093
*Centrico, Inc.	842
Chain-Belt Co.	1416
De Laval Separator Co.	94
Denver Equipment Co.	1146
*Dorr-Oliver Inc.	531
*Eimco Corp.	80
Filterite Corp.	1303
*Hardinge Co., Inc.	582
Hungerford & Terry, Inc.	1164-1166
Minerals & Chemicals Corp. of America	950
*Pfauter Permutit, Inc.	110 & 141
Podbielniak, Inc.	595
*Premier Mill Corp.	1391
*Sharples Corp.	485
Yeomans Brothers Co.	1156

## CLASSIFIERS

Alpine American Corp.	1432-1434
American Tool & Machine Co.	862
*Bird Machine Co.	685
Buell Engineering Co., Inc.	1204
Coulter Industrial Sales Co.	1444
*Denver Equipment Co.	1146
*Dorr-Oliver Inc.	531
*Hardinge Co., Inc.	582
Howes Co., Inc., S.	1029
*Kennedy-Van Saun Mfg. & Engrg. Corp.	1036
*Nichols Engineering & Research Co.	624
NoVo Div., Industrial Enterprises, Inc.	1030
Renneburg & Sons Co., Edw.	1078
Schutz-O'Neill Co.	1028
*Sharples Corp.	485
Southwestern Engineering Co.	1250-1252
*Sprout, Waldron & Co., Inc.	846-848
*Strong-Scott Mfg. Co.	1274-1276-1278
*Sturtevant Mill Co.	421
*Toledo Scale	157
Worthington Corp.	545

## CLUTCHES

Link-Belt Co.	165
Worthington Corp.	545

## COAL TAR OILS

*Allied Chemical Corp.	955-957-959-961
------------------------	-----------------

## COATINGS—PROTECTIVE

*Allied Chemical Corp.	955-957-959-961
*Aluminum Company of America	559
Carey Mfg. Co., Philip.	1152
*Enjay Co., Inc.	944-946-948
Galigher Co.	843
*General American Transportation Corp.	436-442-446-495
General Plastics Corp.	967
*Haveg Industries, Inc.	546
Heil Process Equipment Corp.	1305
*Hercules Powder Co.	916
International Nickel Co., Inc.	509
Knapp Mills, Inc.	175
Knight Co., Maurice A.	586
Lead Industries Assn.	816
*Metal Cladding, Inc.	1378
Nukem Products Corp.	1072
*Pfaudler Permutit, Inc.	110 & 141
Titanium Alloy Mfg. Div., National Lead Co.	234
*U. S. Stoneware Co.	111

## COILS

Bishop & Co., Platinum Works, J.	900-902
Dean Products, Inc.	184
Drayer Hanson Div., National-U. S. Radiator Corp.	850
*Fansteel Metallurgical Corp.	617
*Frick Co.	1258-1260
*Haynes Stellite Co., Div. of Union Carbide Corp.	460-470
Heat Transfer Div., National-U. S. Radiator Corp.	850
Knapp Mills, Inc.	175
National-U. S. Radiator Corp.	850
"Platecoil" Div., Tranter Mfg. Co., Inc.	1206-1208-1210
Renneburg & Sons Co., Edw.	1078

## COKE OVEN MACHINERY

*Allied Chemical Corp.	955-957-959-961
Podbielniak, Inc.	595

## COLLECTORS

American Air Filter Co., Inc.	676
Bartlett & Snow, C. O.	569
Buell Engineering Co., Inc.	1204
Day Co.	45
Dustex Corp.	1299-1301
*Fluid Energy Processing & Equipment Co.	813
*Fuller Co.	446
Industrial Products Engineering Co.	1259
*Jeffrey Mfg. Co.	97
National Dust Collector Corp.	695
Peabody Engineering Corp.	1321
Renneburg & Sons Co., Edw.	1078
Schutz-O'Neill Co.	1028
Sly Mfg. Co., W. W.	73
Southwestern Engineering Co.	1250-1252
*Western Precipitation Corp.	1181
Wheelabrator Corp.	190
Young Machinery Co., Inc., The	1087

## COLLOID MILLS

*Chemicoloid Laboratories, Inc.	618
*Day Co., J. H. Div., Cleveland Automatic Machine Co.	121-122
Denver Equipment Co.	1146
Fitzpatrick Co., W. J. & Fitzpatco Corp.	64
Gifford-Wood Co.	219
Industrial Products Engineering Co.	1259
*Manton-Gaulin Mfg. Co., Inc.	51
*Morehouse-Cowles, Inc.	814
*Premier Mill Corp.	1391
*Ross & Son Co., Inc., Charles	983-985
Scientific Glass Apparatus Co., Inc.	332
Sonic Engineering Corp.	1122
Tri-Homo Corp.	214

## COLORIMETERS

Beckman Instruments, Inc., Scientific & Process Instruments Div.	333
Coleman Instruments, Inc.	320
General Laboratory Supply Co.	310
Milton Roy Co.	610
New York Laboratory Supply Co., Inc.	1012
Photovolt Corp.	389
Precision Scientific Co.	370-372
Scientific Glass Apparatus Co., Inc.	332
Tenso-Lab, Inc.	1123
Welch Mfg. Co., W. M.	205

## COMPARATORS

General Laboratory Supply Co., Inc.	310
Scientific Glass Apparatus Co., Inc.	332
Tenso-Lab, Inc.	1123
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
*Wallace & Tiernan Inc.	686

## COMPRESSORS

*Allis-Chalmers Mfg. Co.	636
Autoclave Engineers	346

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



**permanent  
magnetic  
force...**



**The operating principle  
behind *MAGNETROL*  
LIQUID LEVEL CONTROL**

Because its operating principle, based on the proper use of a permanent magnet, guarantees a perpetual guardianship over your critical liquid levels, the Magnetrol liquid level control unobtrusively takes the most important place in any system or process where it is necessary to keep a liquid at a constant level. Principle and action are so simple that failure is virtually impossible. Magnetrol is versatile, too—will handle almost ANY liquid, at ANY temperature, at ANY pressure, with the same precision and dependability. No mechanical or electrical linkages to stick, bind, ride out of line or wear out. Available for controlling level changes from 1/8" to 150 ft. Multi-stage switching when desired. Write to

**MAGNETROL, Inc., 2124 S. Marshall Blvd., Chicago 23, Illinois**

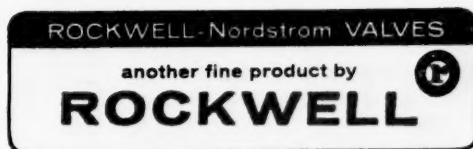


## Rockwell-Nordstrom CORROSION RESISTANT VALVES

Coated valves, completely user-proven on over 200 corrosive services, are just a few of the Rockwell-Nordstrom valve innovations to be exhibited at the ECI. These valves have special chemical or plastic coatings that give iron or steel valves the corrosion resistance of costly alloys . . . many users have replaced stainless steel valves with coated iron valves without the slightest forfeit of performance.

It will pay you to visit the Rockwell exhibit and learn more about *all* the Rockwell-Nordstrom valve innovations that can help you fight ever-rising chemical plant operation costs. There are over 6-million

of these valves in use today proving that their 40 year reputation for leadership, quality and economy is more than a boast. If you can't join us at the ECI, write for complete details. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.



SEE THE NEWEST DEVELOPMENTS IN VALVES AT ROCKWELL BOOTH 69 27th CHEM SHOW

# IF THERE'S A DUST HOG ON YOUR PAYROLL...



... let us show you how to get  
rid of it! See Pangborn's newest  
dust collectors, wet and dry, at  
the Chemical Show!

27th Exposition of Chemical Industries ... Coliseum, NYC  
November 30-December 4 SPACE 681, 2nd FLOOR

# Pangborn

# CONTROLS DUST

## SHOW DIRECTORY . . .

*Frick Co. ....	1258-1260
*Fuller Co. ....	446
*General American Transporta- tion Corp. ....	435-436-442-446-495
Ingersoll-Rand Co. ....	128
McIntosh Equipment Corp. 1343-45-47-49	
*Nash Engineering Co. ....	238
Pressure Products Industries, Inc. ....	1367-1369
Schutte and Koerting Co. ....	61
Scientific Glass Apparatus Co., Inc. ....	332
U. S. Hoffman Machinery Corp., Air Appliance Div. ....	1365
Voss Co., Inc., J. H. H. ....	1224
Worthington Corp. ....	545
Yeomans Brothers Co. ....	1156

## CONCENTRATORS

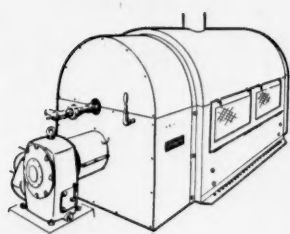
American Tool & Machine Co. ....	862
*Artisan Metal Products. ....	874
*Baker Perkins, Inc. ....	560 & 609
Brown & Co., J. G. ....	1093
Carver, Inc., Fred S. ....	90
*Centrico, Inc. ....	842
De Laval Separator Co. ....	94
*Dorr-Oliver Inc. ....	531
*Fansteel Metallurgical Corp. ....	617
*General American Transporta- tion Corp. ....	435-436-442-446-495
Knapp Mills, Inc. ....	175
Knight Co., Maurice A. ....	586
Mazzoni, G., S. P. A. ....	1412
Precision Scientific Co. ....	370-372
*Sharples Corp. ....	485
Southwestern Engineering Co. ....	1250-1252
Yeomans Brothers Co. ....	1156

## CONDENSERS

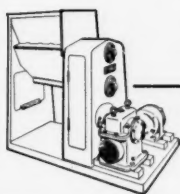
*Allis-Chalmers Mfg. Co. ....	636
American Heat Reclaiming Corp. 1058-1060	
*Artisan Metal Products. ....	874
Carbone Corp. ....	803
Croll-Reynolds Co., Inc. ....	1054
Croll-Reynolds Engineering Co., Inc. ....	1054
Dean Panel Coil Div., Dean Prod- ucts, Inc. ....	184
Devine Mfg. Co., J. P. ....	1372
Distillation Engineering Co. ....	1048
Downtown Iron Works Inc., Div. of Pressed Steel Tank Co. ....	631
Falls Industries, Inc. ....	131
*Fansteel Metallurgical Corp. ....	617
*Frick Co. ....	1258-1260
Glascote Products, Inc. ....	596
Heat Transfer Div., National- U. S. Radiator Corp. ....	850
Ingersoll-Rand Co. ....	128
Kimble Glass Co. ....	390
Mazzoni, G., S. P. A. ....	1412
*National Carbon Co. ....	460-470
National-U. S. Radiator Corp. ....	850
Niagara Blower Co. ....	665
*Patterson-Kelley Co., Inc. ....	188 & 215
Peabody Engineering Corp. ....	1321
*Pfaudler Permutit, Inc. ....	110 & 141
"Platecoil" Div., Tranter Mfg., Inc. ....	1206-1208-1210
Porter Inc., George K. ....	1134-1136
Pressed Steel Tank Co. ....	631
Schutte and Koerting Co. ....	61
Scientific Glass Apparatus Co., Inc. ....	332
Southwestern Engineering Co. ....	1250-1252

\* For additional information see advertise-  
ment in this issue and use your Reader Service  
postcard, p. 247.

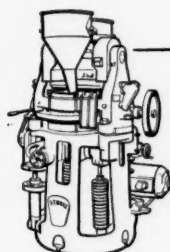




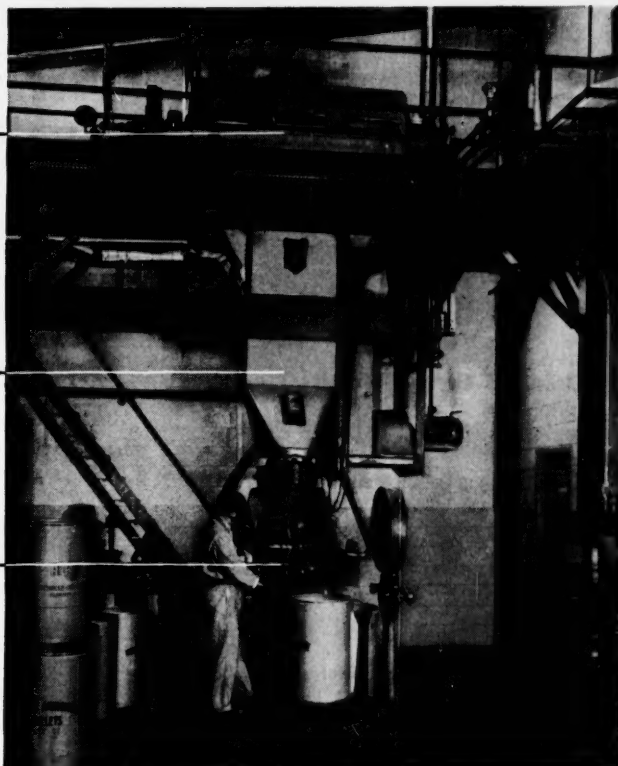
①



②



③



## STOKES FLAKER leads "triple play" production at Reichhold

**Maleic anhydride pellets are produced in a continuous operation... from Stokes flaker-to-granulator-to-tabletter... at a rate of 1200 lbs. per hour.**

Reichhold Chemicals, Inc. has simplified the processing of a difficult-to-handle material with the installation of this Stokes designed processing system. At the company's Elizabeth, N.J. plant, liquid maleic anhydride is pumped from storage tanks into a Stokes drum flaker mounted on a platform directly above a Stokes tabletting machine. A Stokes oscillating granulator is suspended in between.

**Continuous Flow**—After freezing the liquid and converting it into a solid, the flaker delivers the material directly to the granulator which, in turn, feeds the tabletting machine. This "triple play" production line

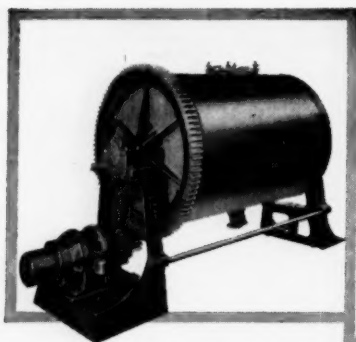
takes advantage of gravity flow and eliminates intermediate handling—exceptionally important because of the corrosive and hygroscopic nature of maleic anhydride, and the fume problem it presents.

Flexibility for unusual problems like this is one of the features you can count on in all Stokes processing equipment... including drum flakers and dryers, rotary and conical vacuum dryers, vacuum shelf dryers, granulators, Tornado® mills, single punch and rotary tabletting machines, vacuum ovens and furnaces, vacuum pumps and a wide range of related equipment. You can count on top performance and economy too, because Stokes design is based on over 50 years of close association with the chemical process industries. Our Laboratory and Advisory Service can help you on special problems. Write or call for full information.

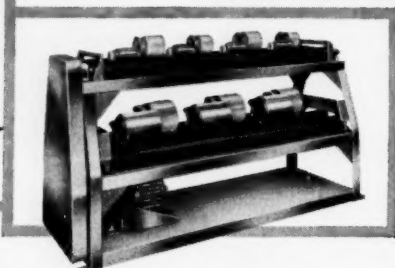
**See us at The Chem Show Booths 38 and 67**

*Processing Equipment Division*  
**F. J. STOKES CORPORATION**  
5500 Tabor Road, Philadelphia 20, Pa.

# STOKES



Style GPH Pebble Mill for Large  
Pulverizing and Grinding Operations.



Style P, Two-Tier Jar Rolling Machine  
for Multiple Batch Processing.

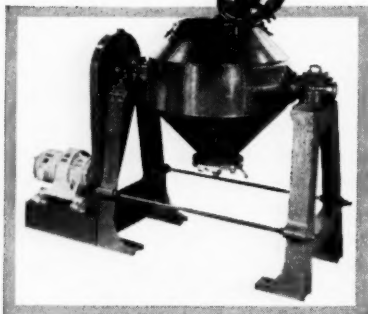
modern equipment

for

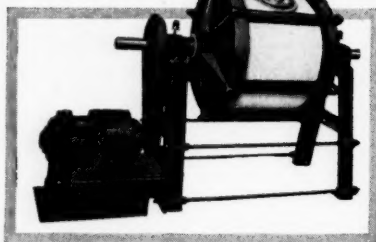
# Profitable Chemical Processing... by **abbé**

Profitable processing of your materials requires modern, precision-built equipment able to maintain uniform quality standards at high production rates. Abbé Engineering offers a complete line of mixing, blending, crushing, grinding, cutting and sifting equipment designed to give top quality production at low operating costs. Abbé Engineering equipment offers you many labor- and time-saving features to simplify your production operations.

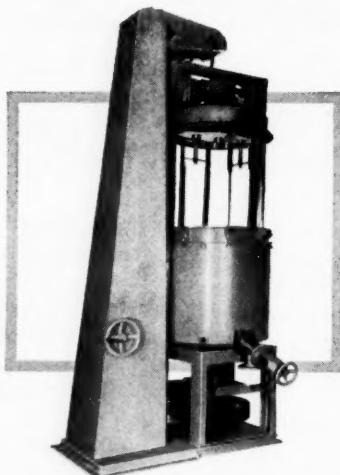
Our engineers will be glad to assist you in solving any problem you may have involving mixing, blending, crushing, grinding, dispersing, cutting or sifting of your materials.



Style BS Double Conical Blender  
for Rapid, Uniform Dry Blending.



Eureka Style Porcelain Jar Mill for Small Batch.



Jacketed Vacuum Dispersall Paste Mixer  
for Homogenizing Pastes.

Send for our General Catalog No. 80

**abbé**

ENGINEERING COMPANY

620 F Graybar Bldg., New York 17, N. Y.

Designers and Manufacturers of

Ball, Pebble and Jar Mills • Pulverizers • Sifters • Cutters • Mixers

## SHOW DIRECTORY . . .

Star Tank & Filter Corp.	233
*Vogt Machine Co., Henry	124
Welch Mfg. Co., W. M.	205
*Westinghouse Electric Corp.	510
Worthington Corp.	545
Young Radiator Co.	1403
Yuba Consolidated Industries, Inc.	882-884-886

## CONTACTORS

*Allis-Chalmers Mfg. Co.	636
Automatic Switch Co.	847
*General American Transportation Corp.	435-436-442-446-495
Knight Co., Maurice A.	586
Mixing Equipment Co., Inc.	146
Podbielniak, Inc.	595
*Westinghouse Electric Corp.	510
Yeomans Brothers Co.	1156

## CONTAINERS

*Alloy Products Corp.	1205
*Aluminum Company of America	559
Associated Cooperage Industries of America, Inc.	898
Binder Cooperage Co., Inc.	1127
Continental Can Co., Inc., Fibre Drum & Corrugated Box Div.	899-901-903
Delaware Barrel & Drum Co., Inc.	1187-1189-1193
Greif Bros. Cooperage Corp.	41
*Hercules Powder Co.	916
Kimble Glass Co.	390
Knapp Mills, Inc.	175
*Metal Cladding, Inc.	1378
Package Research Laboratory	1261-1263
Pressed Steel Tank Co.	631
*Protectoseal Co.	1286
Rheem Mfg. Co.	808-810
Scientific Glass Apparatus Co., Inc.	332
*Sprout, Waldron & Co., Inc.	846-848
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
United Box & Lumber Co.	1085

## CONTROL APPARATUS

*Allis-Chalmers Mfg. Co.	636
Automatic Switch Co.	847
B-I-F Industries, Inc.	660
*Bailey Meter Co.	46
*Barber-Colman Co., Wheelco Instruments Div.	395
Beckman Instruments, Inc., Scientific & Process Instruments Div.	333
*Brooks Rotameter Co.	998
Coulter Industrial Sales Co.	1444
Edison Industries, T. A., Instrument Div., McGraw-Edison Co.	945
Falcon Alarm Co.	1343-45-47-49
Fike Metal Products Corp.	1427
Fischer & Porter Co.	496
Flow-Actuated Control Co.	1343-45-47-49
Foxboro Co., The	519
*Frick Co.	1258-1260
*Fuller Co.	446
*Fulton Sylphon Div., Robertshaw-Fulton Controls Co.	1293
Gems Co.	1343-45-47-49
*General Electric Co.	482
Jacoby-Tarbox Corp.	1362
Jarco Services, Inc.	1343-45-47-49
Leslie Co.	1333
Magnetrol, Inc.	910-912

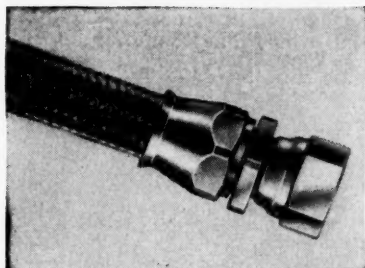
\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

# Visit Us at the Chemical Show!

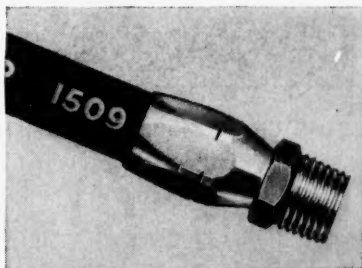
**Aeroquip**  
**Booth No. 1255**



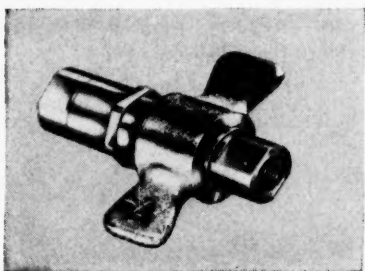
See the wide range of Aeroquip Hose, Reusable Fittings, Self-Sealing Couplings and Marman CONOSEAL Joints, for specific uses in the chemical industry. Let us show you the advantages Aeroquip offers for fluid-carrying lines operating under conditions of high temperature, high pressure or corrosion.



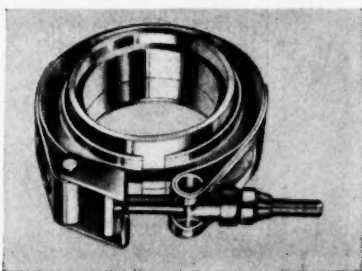
**Aeroquip Hose of Teflon**, with patented\* Reusable **"super gem"** Fittings, for lines carrying corrosive chemicals, high temperature fluids, including steam.



**Aeroquip Type 1509 High Pressure Hose and Reusable Fittings** for lines carrying hydraulic fluids, air. Temperatures from  $-40^{\circ}$  to  $+200^{\circ}$  F.



**Aeroquip 5100 Series Self-Sealing Coupling** for fluid lines where frequent disconnection is necessary. Disconnect and reconnect under pressure, without fluid loss or air entry.



**Marman CONOSEAL Joint** connects high pressure, high temperature fluid lines, seals against leakage, joins dissimilar metals, handles severe shock and distortion. (MARMAN DIVISION, LOS ANGELES 64, CALIF.)

**"super gem"** is an Aeroquip trademark. \*U.S. Patent Nos. 2,833,567 and 2,731,279. Teflon is DuPont's tradename for its tetrafluoroethylene resin. CONOSEAL is an Aeroquip trademark

**Aeroquip**  
REG. TRADEMARK

**AEROQUIP CORPORATION, JACKSON, MICHIGAN**

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA

AEROQUIP (CANADA) LTD., TORONTO 19, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

## SHOW DIRECTORY . . .

Mine Safety Appliances Co.	14-16
*Minneapolis-Honeywell Regulator Co.	635
Norcross Corp.	443
Precision Thermometer & Instrument Co.	1401
Pressure Products Industries, Inc.	1367-1369
Seavy & Sons, M. J.	1071
Scientific Glass Apparatus Co., Inc.	332
*Taylor Instrument Companies	104
Tenno-Lab., Inc.	1123
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Thermo Electric Co., Inc.	817
Terice Co., H. O.	1287
Warrick, Charles F., Co.	1343-45-47
Welch Mfg. Co., W. M.	205
Westinghouse Electric Corp.	510

### CONTROLLERS

*Allis-Chalmers Mfg. Co.	636
Automatic Switch Co.	847
*Barber-Colman Co., Wheelco Instruments Div.	395
B-I-F Industries, Inc.	660
*Black, Sivalis & Bryson, Inc.	669
*Brooks Rotameter Co.	998
Burling Instrument Co.	9
Distillation Engineering Co.	1048
Falcon Alarm Co.	1343-45-47-49
Fischer & Porter Co.	496
Flow Actuated Control Co.	1343-45-47-49
*Foxboro Co., The	519
*Fulton Siphon Div., Robertshaw-Fulton Controls Co.	1293

Gems Co.	1343-45-47-49
Hastings-Raydist, Inc.	1020
Industrial Nucleonics Corp.	1418-1420
Jarco Services, Inc.	1349-1351-1353
Leslie Co.	1333
Magnetrol, Inc.	910-912
Mettler Instrument Corp.	339
*Minneapolis-Honeywell Regulator Co.	635
Norcross Corp.	443
RKL Controls, Inc.	1405
*Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div.	1366-1368
*Rockwell Mfg. Co.	69
Seavy & Sons, M. J.	1071
*Selas Corp. of America	979-981
*Strong, Carlisle & Hammond	1121
*Superior Electric Co.	804
*Taylor Instrument Companies	104
Thermo Electric Co., Inc.	817
Warrick Co., Charles F.	1343-45-47-49
Westinghouse Electric Corp.	510

### CONVEYING MACHINERY AND EQUIPMENT

*Artisan Metal Products	874
Bartlett & Snow Co., C. O.	569
Bemis Bro. Bag Co.	164-166
Bucket Elevator Co.	1038
*Carrier Conveyor Corp.	127
Chain Belt Co.	1416
Cherry-Burrell Corp.	1039-1045-1049
Cleveland Vibrator Co.	993-995
*Commercial Filters Corp.	223
Day Co.	45
Denver Equipment Co.	1146
*Dracco Div., Fuller Co.	495
*Fuller Co.	446
*General American Transportation Corp.	435-436-442-446-495

Gifford Wood Co.	219
Great Western Mfg. Co.	216
Hapman Conveyors, Inc.	1358
Howes Co., Inc., S.	1029
Industrial Nucleonics Corp.	1418-1420
*Jeffrey Mfg. Co.	97
*Kennedy-Van Saun Mfg. & Engrg. Corp.	1036
Link-Belt Co.	165
M-H Standard Corp.	997
*Philadelphia Gear Corp.	123
Read Standard Div., Capitol Products Corp.	162
Renneburg & Sons Co., Edw.	1078
RKL Controls, Inc.	1405
*Sargent's Sons Corp., C. G.	1375-1377
Simon-Carter Co.	1096
*Sprout, Waldron & Co., Inc.	846-848
*Strong, Scott Mfg. Co.	1274-1276-1278
*Sturtevant Mill Co.	421
Syntrom Co.	163
U. S. Hoffman Machinery Corp.	1365
Vac-U-Max	1195-1197
Yeomans Brothers Co.	1156
Young Machinery Co., Inc.	1087

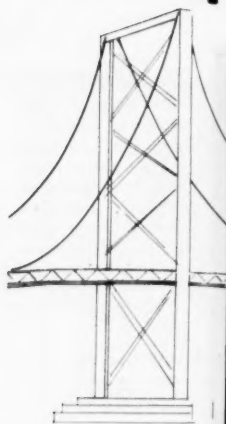
### COOLERS

A.P.V. Company, Inc.	1302
*Adams Co., Inc., R. P.	836
American Heat Reclaiming Corp.	1058-1060
Bartlett & Snow Co., C. O.	569
Carbone Corp.	803
*Carrier Conveyor Corp.	127
*Corning Glass Works	134
Croll-Reynolds Engineering Co., Inc.	1054
Dean Products, Inc.	184
Dean Panel Coil Div., Dean Products, Inc.	184
De Laval Separator Co.	94
Downingtown Iron Works Inc., Div. of Pressed Steel Tank Co.	631
Drayer Hanson Div., National-U. S. Radiator Corp.	850
*Durion Co., Inc.	520 & 532
Falls Industries, Inc.	131
*Fansteel Metallurgical Corp.	617
*Frick Co.	1258-1260
*Fuller Co.	446
*General American Transportation Corp.	435-436-442-446-495
*Hardinge Co., Inc.	582
Heat Transfer Div., National-U. S. Radiator Corp.	850
Industrial Products Engineering Co.	1259
*Jeffrey Mfg. Co.	97
*Kennedy-Van Saun Mfg. & Engrg. Corp.	1036
Knight Co., Maurice A.	586
Mazzoni, O., S. P. A.	1412
*National Carbon Co.	460-470
National-U. S. Radiator Corp.	850
Niagara Blower Co.	655
Peabody Engineering Corp.	1321
*Pfaudler Permutit, Inc.	110 & 141
"Platecoil" Div., Tranter Mfg., Inc.	1206-1208-1210
Porter Inc., George K.	1134-1136
Pressed Steel Tank Co.	631
Renneburg & Sons Co., Edw.	1078
Rietz Mfg. Co.	1231
Schutte & Koerting Co.	61
Scientific Glass Apparatus Co., Inc.	332
Simpson Co., Orville	1150
Southwestern Engineering Co.	1250-1252
*Sprout, Waldron & Co., Inc.	846-848
*Standard Steel Corp.	153

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

SEE YOU AT THE CHEM SHOW, BOOTH NO. 1378

# Kabe-O-Rap



PATENTS PENDING

An Exclusive Design in Reinforced Plastic Tanks

by METAL CLADDING INC.

North Tonawanda, N. Y.



# REDUCE PRODUCT COSTS WITH JOB-ENGINEERED, MULTI-DUTY CARRIER EQUIPMENT!

Each Carrier Natural-Frequency Vibrating unit you see on this page has been custom-designed specifically to combine vital processing steps with conveying. Each produces lower product costs through savings in manpower, floor space, general maintenance and downtime. One Carrier custom-engineered unit often

replaces several single purpose, "off-the-shelf" conveyors and processing units. If you're planning a new process or would like to investigate ideas to improve your present system, Carrier engineers will welcome the chance to help you plan a better way to get the job done with Natural-Frequency.

## ELEVATE-DEWATER-DRY

Explosive pellets at 3000 PPH are dewatered and dried from slurry to 0.3% moisture on this 18' vibrating spiral elevator. Retention time is 15 minutes on spiral flights, equivalent to 118' of horizontal conveyor.

## DRY-SCREEN

Unique combination dryer-conveyor dries, screens, and conveys 2 TPD of  $\frac{5}{16}$ " carbonaceous particles. Moisture is reduced from 14% to .5% by 350°F air . . . fines are screened before material reaches 30' "conveying-only" section.

## COOLING-SCALPING

3000 PPH of spray dried product is cooled from 150°F to 90°F as it conveys along this water-cooled vibrating conveyor (30' long, 2½' wide). Oversized particles are scalped across a 10' long, 20-mesh screen at the discharge end.

## FEEDER-HOPPER BOTTOM PACKAGE

You cut engineering and installation costs with this pre-assembled Ampitrol feeder package. Package includes feeder, hopper bottom, flanged hopper connection, skirt plates, regulating gate isolation and suspension supports.

## BAG FLATTENING

Efficient, low cost vibrating bag flatteners can give you up to 15% more storage space. Bags are flattened with no damage to product or bag; bags stack higher, make tighter patterns. Wheel-mounted models available.

## DISTRIBUTE

Carrier Conveyors can be designed to control the flow and distribute materials to screens, crushers, bins, mills, etc. Special dividers and discharge gates permit distribution of one material to several discharges or distribution of several materials to one or more discharges.

**CARRIER**  
**NATURAL-FREQUENCY®**  
**VIBRATING EQUIPMENT**  
Engineering Specialists in Vibrating Equipment



**VISIT THE CARRIER EXHIBIT  
AT THE CHEMICAL SHOW  
BOOTH 127, MAIN FLOOR**

get **MORE** vacuum pumping  
per dollar ... *plus*\*



with the *NEW*

## STOKES MICROVAC PUMPS

Stokes Series "H" Microvac Pumps were designed by vacuum specialists—are built by skilled personnel in modern, well equipped facilities—were industry engineered to meet *your* requirements. Stokes Microvac Pumps are . . .

- \* **Compact**—require little height or floor area
- \* **Balanced**—for smooth, vibration-free operation
- \* **Quiet**—for service anywhere, lab or plant
- \* **Complete**—no optional equipment to buy
- \* **In Stock**—for immediate delivery
- \* **Models** with up to 500 c.f.m. displacement

To support every Stokes customer—we offer a complete application engineering advisory service of trained vacuum specialists. Write for complete literature or application assistance on all models.

Vacuum Equipment Division  
F. J. STOKES CORPORATION  
5500 Tabor Road, Philadelphia 20, Pa.

# STOKES

### SHOW DIRECTORY . . .

\*Westinghouse Electric Corp....510  
Young Radiator Co.....1403  
Yuba Consolidated Industries,  
Inc. ....882-884-886

#### COOPERAGE

Associated Cooperage Industries  
of America, Inc.....898  
Binder Cooperage Co., Inc.....1127  
Greif Bros. Cooperage Corp..... 41

#### COUPLINGS

\*Allis Co., Louis.....100  
Chain Belt Co.....1416  
\*Chiksan Co., A Subsidiary of  
Food Machinery & Chemical  
Corp. ....1268-1270  
Crawford Fitting Co.....987-989  
Ever-Tite Coupling Co., Inc.....1159  
Fibercast Co. Div., Youngstown  
Sheet & Tube Co. ....870  
Imperial Brass Mfg. Co....894-896  
Link-Belt Co. ....165  
Parker Fittings & Hose Div.,  
Parker-Hannifin Corp. ....431  
\*Philadelphia Gear Corp.....123  
Sier-Bath Gear & Pump Co.,  
Inc. ....806  
Victaulic Company of America  
1190-1192

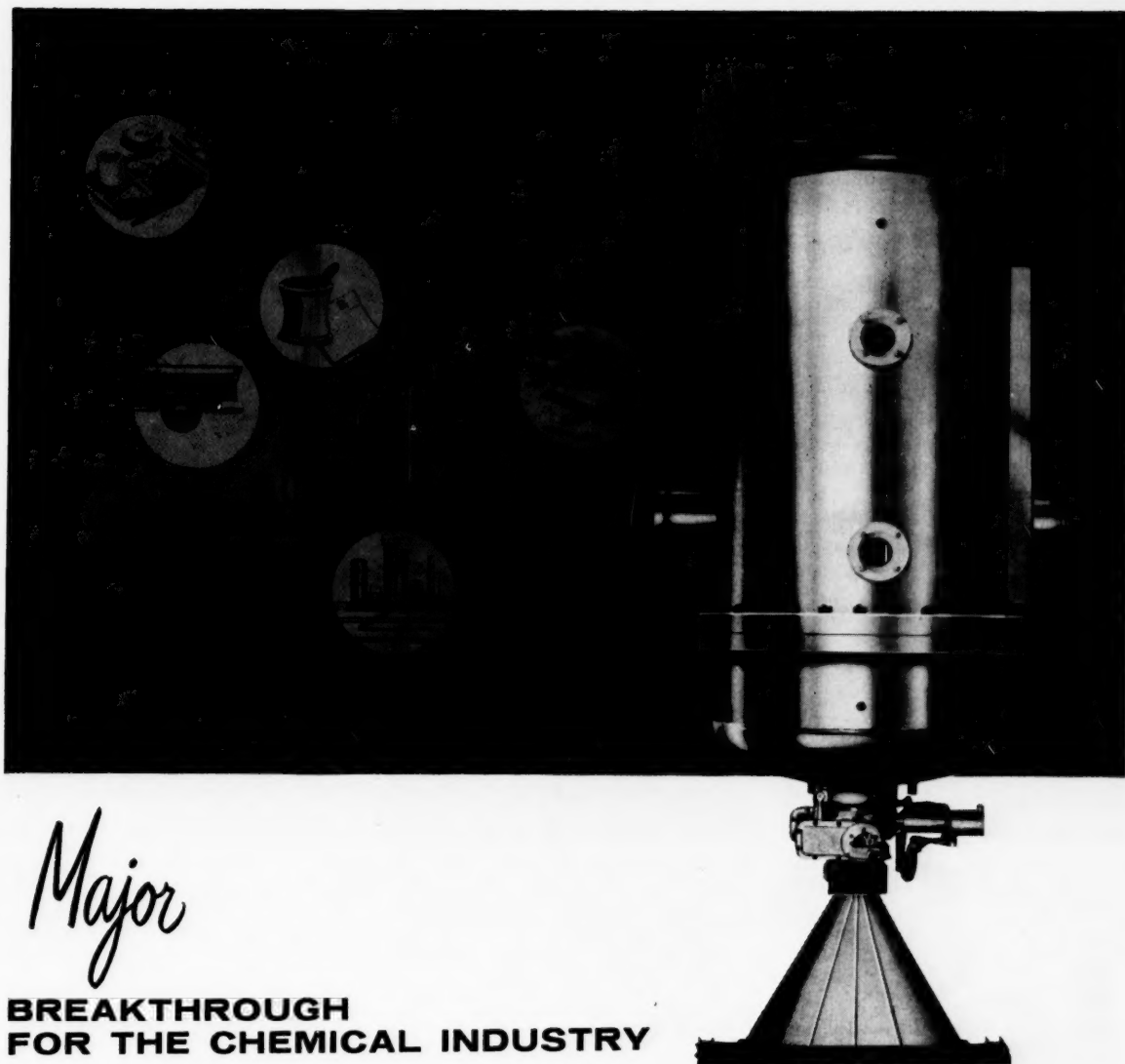
#### CRUCIBLES

Bishop & Co., Platinum Works,  
J. ....900-902  
Carbone Corp. ....803  
\*Corning Glass Works.....134  
Engelhard Industries, Inc....192-196  
Falls Industries, Inc.....131  
\*Fansteel Metallurgical Corp....617  
Laboratory Equipment Corp....905  
\*Metals & Controls Div., Texas  
Instruments, Inc. ....1094  
\*National Carbon Co.....460-470  
New York Laboratory Supply Co.,  
Inc. ....1022  
\*Norton Co. ....1289-1291  
Tensolab, Inc. ....1123  
Titanium Alloy Mfg. Div., Na-  
tional Lead Co.....234  
Welch Mfg. Co., W. M.....205

#### CRUSHERS, GRINDING MILLS AND PULVERIZERS

Abbe', Inc., Paul O.....984  
\*Allis-Chalmers Mfg. Co.....636  
Bartlett & Snow Co., C. O.....569  
Brabender Instruments, Inc., C.  
W. ....340  
Cog Corp., The, Div. of Motio-  
graph, Inc. ....1388  
Denver Equipment Co.....1146  
\*Eimco Corp., The..... 80  
Entoleter Div., Safety Industries,  
Inc. ....1599  
Fitzpatrick Co., W. J., & Fitz-  
patco Corp. .... 64  
\*Fluid Energy Processing &  
Equipment Co. ....813  
\*Fuller Co. ....446  
Galigher Co., ....843  
\*General American Transportation  
Corp. ....435-436-442-446-495  
Gifford Wood Co.....219  
\*Hardinge Co., Inc. ....582  
Howes Co., Inc., S.....1029  
\*Jeffrey Mfg. Co..... 97  
\*Kennedy-Van Saun Mfg. &  
Engrg. Corp. ....1036

\* For additional information see advertise-  
ment in this issue and use your Reader Service  
postcard, p. 247.



*Major*

**BREAKTHROUGH  
FOR THE CHEMICAL INDUSTRY**

## **LOW COST\* IRRADIATION**

*New*

**DYNAMITRON™ ACCELERATOR**  
FEATURES 10 TIMES MORE  
PRODUCT THROUGH-PUT ...  
SAME CAPITAL INVESTMENT

### **TYPICAL LOW COST IRRADIATION APPLICATIONS**

- FOOD** — for preservation and spoilage reduction
- DRUGS** — "cold sterilization" of antibiotics, surgical supplies and human tissue for transplant
- RUBBER** — vulcanization at a fraction of the time and cost
- PLASTICS** — cross-linking for increased temperature resistance, strength, insulating properties and chemical inertness
- CHEMICALS** — initiating and increasing catalytic reactions
- PETROLEUM** — "cracking" of crudes—higher yields
- ELECTRONICS** — semi-conductive material research and improvement of wire coatings
- RESEARCH** — basic research, higher yields, faster data accumulation

This entirely new concept in high voltage particle accelerators has broken the radiation "cost barrier." RDI's technological advance features **compactness, reliability, minimum maintenance and operating expenses, and low capital cost per kilowatt of radiation energy.**

RDI has constructed one of the largest radiation facilities in the country for the purpose of demonstrating practical industrial and military applications.

Dynamitron models are available from 0.5 Mev. to 3.0 Mev. in power ranges from 7½ Kw. to 30 Kw. For specific information on individual models and processing costs for your industry, write today to Application Engineering, Dept. K.

**RADIATION DYNAMICS, INC.**

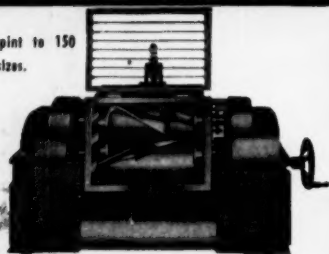
Westbury Industrial Park  
Westbury, Long Island

\*\$4,000 PER KILOWATT OUTPUT  
\*\*PATENTED

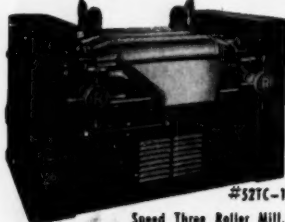
EN

# **Ross** Leading mfrs. of **MIXING AND GRINDING EQUIPMENT** for over 90 years

\* 1 pint to 150 gal. sizes.



#41L-10 Gal. Double Arm Kneader with two speed brake motor. Jacked trough and motor operated lift optional.



\* 4 1/2 x 10, 6 x 14, 9 x 24, 12 x 30, 14 x 32, 16 x 40\" sizes.

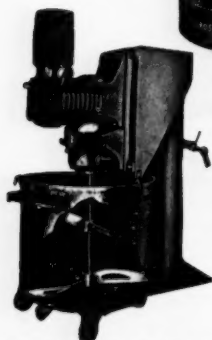
#527C-14\" x 32\" High

Speed Three Roller Mill. Hydraulic adjustment and pressure recording gauges optional.

#30C-50 Gal. Heavy Duty Change Can Mixer. Adjustable outer scraper, cover with charging port, and gates on cans optional.



\* 8, 16, 20, 50 and 60 gal. sizes.



#130H-250 Gal. Change Tank Mixer with hydraulic raising and lowering and variable speed motor. Various type stirrers and high speed impellers optional.

\* 80, 150 and 250 gal. sizes.

#130EL-1 Gal. Double Planetary type Change Can Mixer with shearing action stirrers, and variable speed reversing type motor. Jacked cans and portable trucks for cans optional.



\* 1, 2, 3, 4, 6, 15, 25, 50, 65, 85, 110 and 150 gal. sizes.

Also Dry Crushing and Pulverizing Mills, Hopper Mills, High Speed Dissolvers or Dispersers, and Mixers of all types for dry, liquid, paste, or heavy paste materials.

Write for complete information!

**CHARLES ROSS & SON  
COMPANY, INC.**

150 CLASSON AVENUE

BROOKLYN 5, N. Y.

## SHOW DIRECTORY . . .

*Morehouse-Cowles, Inc. . . . .	814
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. . . . .	850
Patterson Foundry and Machine Co. . . . .	154
Posey Iron Works, Inc. . . . .	1407
*Prater Pulverizer Co. . . . .	904-906
*Premier Mill Corp. . . . .	1391
Pulva Corp. . . . .	220
{Pulverizing Machinery Div., Metals Disintegrating Co., Inc. . . . .	632
Rietz Mfg. Co. . . . .	1231
Renneburg & Sons Co., Edw. . . . .	1078
*Ross & Son Co., Inc., Charles . . . . .	983-985
Schutz-O'Neill Co. . . . .	1028
Smith Co., T. L. . . . .	986
Southwestern Engineering Co. . . . .	1250-1252
*Sprout, Waldron & Co., Inc. . . . .	846-848
*Strong-Scott Mfg. Co. . . . .	1274-1276-1278
*Sturtevant Mill Co. . . . .	421
Supreme Div., Franklin P. Miller & Son, Inc. . . . .	1010
Tenso-Lab., Inc. . . . .	1123
Tri-Homo Corp. . . . .	214
*U. S. Stoneware Co. . . . .	111
Union Process Co. . . . .	1311-1313
*Williams Patent Crusher & Pulverizer Co. . . . .	161

## CRYSTALLIZING EQUIPMENT

Carver, Inc., Fred S. . . . .	90
Chicago Bridge & Iron Co. . . . .	844
Cleveland Mixer Co. . . . .	1067-1069
*Devine Mfg. Co., J. P. . . . .	1372
*Dorr-Oliver Incorporated . . . . .	531
*General American Transportation Corp. . . . .	435-436-442-446-495
Glascote Products, Inc. . . . .	596
Lee Metal Products Co., Inc. . . . .	1384
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. . . . .	850
*Pfaunder Permutit, Inc. . . . .	110 & 141
Rietz Manufacturing Co. . . . .	1231
U. S. Mixers Div. of Stockdale Engineering Co. . . . .	1237
*Vogt Machine Co., Henry. . . . .	124

## CUTTERS

*Day Co., J. H. Div., Cleveland Automatic Machine Co. . . . .	121-122
Ingersoll-Rand Co. . . . .	128
*Sprout, Waldron & Co., Inc. . . . .	846-848
*Stokes Corp., F. J. . . . .	38 & 67
Taylor Stiles & Co. . . . .	1357

## CYLINDERS FOR HIGH PRESSURE GASES

Autoclave Engineers . . . . .	346
High Pressure Equipment Co., Inc. . . . .	1215-1217
Hoke Inc. . . . .	201
Pressed Steel Tank Co. . . . .	631

## CO<sub>2</sub> RECORDERS

Beckman Instruments, Inc., Scientific & Process Instruments Div. . . . .	333
Cambridge Instrument Co., Inc. . . . .	376
Gow-Mac Instrument Co. . . . .	1246
Mine Safety Appliances Co. . . . .	14-16

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Scientific Glass Apparatus Co., Inc. . . . .	332
Technicon Controls, Inc. . . . .	316
Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .	1329-1331

## DECOLORIZATION AND PURIFYING MATERIALS

*Allied Chemical Corp. . . . .	955-957-959-961
*Barnebey-Cheney Co. . . . .	52
Catalytic Combustion Corp. . . . .	1209
Scientific Glass Apparatus Co., Inc. . . . .	332
*Wallace & Tiernan Inc. . . . .	680
West Virginia Pulp & Paper Co., Industrial Chemical Sales Div. . . . .	924-926
Yeomans Brothers Co. . . . .	1106

## DETERGENTS

*Allied Chemical Corp. . . . .	955-957-959-961
Continental Oil Co. . . . .	930
Scientific Glass Apparatus Co., Inc. . . . .	332

## DIGESTERS

*Allied Chemical Corp. . . . .	955-957-959-961
Blaw-Knox Co. . . . .	581
Chemical and Pharmaceutical Industry Co., Inc. . . . .	1064
Chicago Bridge & Iron Co. . . . .	1388-1390
Devine Manufacturing Co., J. P. . . . .	1372
Downingtown Iron Works Inc., Div. of Pressed Steel Tank Co. . . . .	631
*Eimco Corp. . . . .	80
*General American Transportation Corp. . . . .	436-442-446-495
*Haveg Industries, Inc. . . . .	546
Knapp Mills, Inc. . . . .	175
Koven Fabricators, Inc. . . . .	74
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. . . . .	850
Posey Iron Works, Inc. . . . .	1407
Pressed Steel Tank Co. . . . .	631
Renneburg & Sons Co., Edw. . . . .	1078
*Ross & Son Co., Inc., Charles. . . . .	983-985
*Sprout, Waldron & Co., Inc. . . . .	844-846-848
Yeomans Brothers Co. . . . .	1156

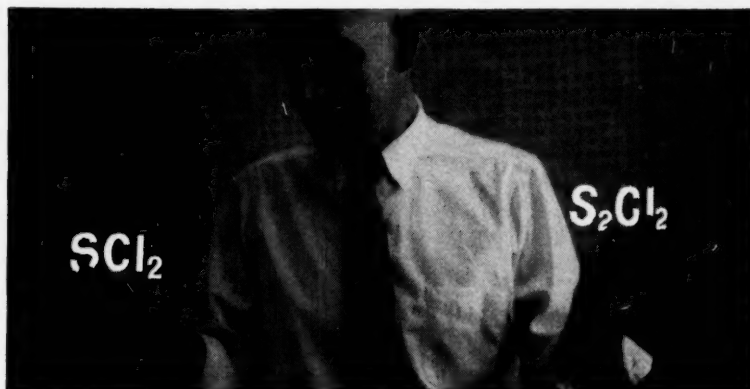
## DISSOLVERS

*Allied Chemical Corp. . . . .	955-957-959-961
*Baker Perkins, Inc. . . . .	560 & 609
Blaw-Knox Co. . . . .	581
Cleveland Mixer Co. . . . .	1067-1069
*Day Co., J. H. Div., Cleveland Automatic Machine Co. . . . .	121-122
Denver Equipment Co. . . . .	1146
Gabb Special Products, Inc. . . . .	1106
*General American Transportation Corp. . . . .	435-436-442-446-495
Gifford-Wood Co. . . . .	219
Hockmeyer & Co., Herman. . . . .	1178
*Morehouse-Cowles, Inc. . . . .	814
*Netco Corp. . . . .	79
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. . . . .	850
Patterson Foundry and Machine Co. . . . .	154
*Premier Mill Corp. . . . .	1391



# BRIEFS

on choosing a better sulfur chloride...  
extra-pure phenol without extra cost  
...a sulfate-low oxalic acid



## Sulfur chlorides—mono- or di-?

Is there an advantage in using a sulfur monochloride and chlorine mixture in place of sulfur dichloride?

Yes.

You can purify the *mono-* by simple distillation should you want to. And you can store *mono-* for long periods without gas pressure developing in the container.

In many cases it's possible to use the *monochloride* or *dichloride* interchangeably. You can often consider sulfur *dichloride* as the equivalent of a mixture of sulfur *monochloride* and

chlorine in figuring your needs.

If other factors make you want sulfur *dichloride*, we'll be happy to sell it to you—as well as the *mono-* or any of our other chlorinating agents: chlorine, sulfuryl chloride, thionyl chloride, and muriatic acid.

There are a number of helpful tips on which products to use to meet different conditions in our Bulletin 328-B, "Chlorinating Agents." Check the coupon for your copy. Data and specification sheets on each product are also available.

Another indicator of quality is this product's freezing point—a 40.6°C minimum.

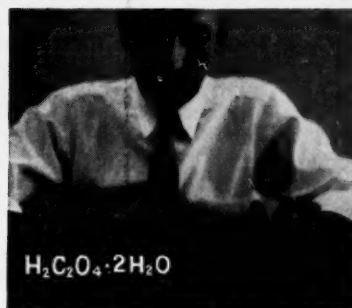
Its distillation range is only 2° from first drop (180°C) to dryness.

Hooker phenol meets or exceeds all requirements of U. S. Pharmacopoeia XV.

Shipments reach you without delay.

For more complete specifications and other data, send the coupon.

**Bulletin on handling phenol.** The Manufacturing Chemists Association has put out a Chemical Safety Data Sheet on phenol which we are offering as Hooker Bulletin 166. You can get a copy of this also by sending the coupon.



## Want oxalic acid that's 99.8% pure?

Recently, a customer wrote to commend us on the low sulfate content of our oxalic acid.

We accepted his commendation with delight, but without surprise, since we set our specs to read: 150 to 300 ppm sulfate, max.

Fact is, our over-all specs call for oxalic acid that is at least 99.8% pure. That's about as pure an oxalic as you will find anywhere outside a laboratory.

You can get this extra purity at regular cost in two pure-white crystals—No. 2 and No. 3 fine. Both in 100 lb. and 300 lb. Leverpaks.

**Send for data sheet.** Our data sheet lists all the pertinent specifications, physical properties, packing data and handling precautions. Check coupon for a copy.



## 99.8% PURE PHENOL at regular prices

Why settle for less when you can get Hooker phenol that's typically 99.8% pure (by bromination assay) at the regular price?

For more information on chemicals mentioned on this page, check:

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Sulfur Dichloride                   | <input type="checkbox"/> Chlorine                      | <input type="checkbox"/> Thionyl Chloride |
| <input type="checkbox"/> Sulfur Monochloride                 | <input type="checkbox"/> Sulfuryl Chloride             | <input type="checkbox"/> Muriatic Acid    |
| <input type="checkbox"/> Chlorinating Agents, Bulletin 328-B | <input type="checkbox"/> Handling Phenol, Bulletin 166 | <input type="checkbox"/> Phenol           |
|  |  | <input type="checkbox"/> Oxalic Acid      |

Clip and mail to us with your name, title, and company address. When requesting samples, please use business letterhead.

### HOOKEER CHEMICAL CORPORATION

411 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

Sales Offices: Chicago Detroit Los Angeles New York  
Niagara Falls Philadelphia Tacoma Worcester, Mass.  
In Canada: Hooker Chemicals Limited, North Vancouver, B. C.



# Grandma could get away with it!



Grandma's recipes were a pinch of this and a dibby-dab of that.

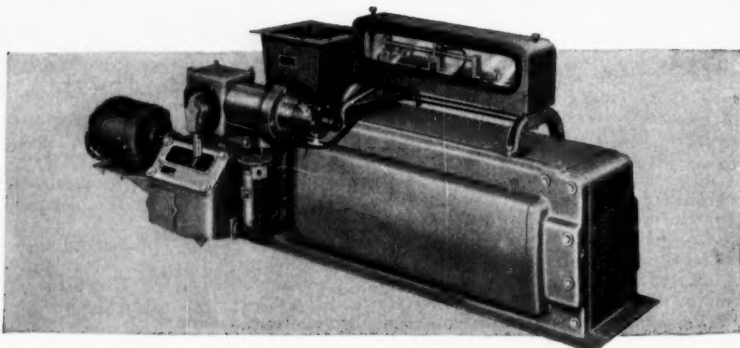
That was fine for Grandma. But it won't work in process blending. Here, you need precise control, minute-to-minute accuracy, exact formulations.

And you get just this and more with W&T's Merchen Scale Feeders and Meters. They control or measure feed rates by weight. There's no guess work. You get exactly what you set the equipment for . . . yields are known; quality is controlled.

You can feed any free-flowing solid in batch or continuous blending operations . . . as little as 3 lbs. per minute; as much as 3000.

And you do it with W&T's rugged, compact Merchen equipment—built for performance . . . built to give you profit-making control . . . built to take the "Grandma" out of your process blending.

Interested? Write Dept. M-49.29.



**WALLACE & TIERNAN INCORPORATED**

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

## WATER ISN'T CHEAP ENOUGH TO WASTE

W&T controlled chlorination saves water and lowers treatment costs. You get maximum water value and use . . . even reuse.

Write for details on the new V-notch chlorinators:  
address Dept. S-137.29



**WALLACE & TIERNAN INCORPORATED**

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

### SHOW DIRECTORY . . .

- \*Ross & Son Co., Inc., Charles..983-985
- Scientific Glass Apparatus Co., Inc. ....332
- Specialty Machinery Corp....1413 & 1430
- Star Tank & Filter Corp.....233
- Terriss Div., Consolidated Siphon Supply Co., Inc. ....1329-1331
- U. S. Mixers, Div. of Stockdale Engineering Co. ....1237
- Yeomans Brothers Co.....1156

### DISTILLING MACHINERY AND APPARATUS

- \*Artisan Metal Products.....874
- Barnstead Still and Sterilizer Co.416
- Blaw-Knox Co. ....581
- Chemical and Pharmaceutical Industry Co., Inc. ....1064
- \*Consolidated Vacuum Corp....1353
- \*Dean Brothers Pumps, Inc....1245-1247-1249
- Distillation Engineering Co....1048
- Hospital Supply Co., Inc.....975
- Hunt Machine Co., Rodney...1240-1242-1244
- Kimble Glass Co. ....390
- Lead Lined Iron Pipe Co.....70
- New York Laboratory Supply Co., Inc. ....1022
- Packed Column Corp.....1171
- \*Pfaudler Permutit, Inc. ....110 & 141
- Podbielniak, Inc. ....595
- Porter Inc., George K....1134-1136
- Scientific Development Co.....382
- Scientific Glass Apparatus Co., Inc. ....332
- Seavy & Sons, N. J. ....1071
- Star Tank & Filter Corp.....233
- \*Stokes Corp., F. J.....38 & 67
- Tenso-Lab., Inc. ....1123
- \*U. S. Stoneware Co. ....111
- Wilmot Castle Co. ....1033

### DRIVES

- \*Allis Co., Louis.....100
- Chain Belt Co. ....1416
- Cleveland Worm & Gear Co.....158
- \*Frick Co. ....1258-1260
- Glascote Products, Inc.....596
- \*Jeffrey Mfg. Co. ....97
- Lehmann Co. Inc., J. N. ....1429-1431-1446
- Link-Belt Co. ....165
- \*Netco Corp. ....79
- \*Pfaudler Permutit, Inc. ....110 & 141
- \*Philadelphia Gear Corp.....123
- Renneburg & Sons Co., Edw....1078
- \*Rockwell Manufacturing Co....69
- Star Tank & Filter Corp.....233
- U. S. Electrical Motors, Inc.....837
- U. S. Mixers, Div. of Stockdale Engineering Co. ....1237
- \*Westinghouse Electric Corp. ....510
- Worthington Corp. ....545

### DRUMS, ROTARY VACUUM

- \*Davenport Machine & Foundry Co. ....818
- \*Devine Mfg. Co., J. P.....1372
- \*Dorr-Oliver Inc. ....531
- \*Eimco Corp. ....80
- Filtration Engineers Div., American Machine & Metals, Inc....456
- \*Komline-Sanderson Engineering Corp. ....1307-1309
- North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. ....850

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



## ***Yarway Impulse puts the heat on steam trap freeze-up problems***

Cold weather means nothing to a Yarway Impulse Steam Trap. *Its design offers full protection against freeze-ups*, with resulting costly production delays and extra maintenance work.

In the Yarway Impulse Trap there's nothing to freeze. No condensate collects. The only moving part (a tiny piston-like valve) continually tests for condensate and discharges it as soon as it forms. Result—continual operation of steam equipment at high, even temperatures.

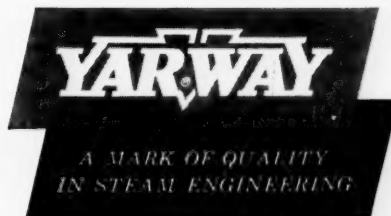
Consider this non-freeze feature with these other Yarway Impulse features:

- Quick heat-up
- Low maintenance
- Stainless steel construction
- Small size—light weight
- Good for all pressures
- Complete line  
for all requirements

—and you have the reasons for nearly 1,300,000 successful installations.

Stocked and sold by 270 Industrial Distributors, coast-to-coast and around the world.

**YARNALL-WARING COMPANY**  
100 Mermaid Ave., Philadelphia 18, Pa.  
BRANCH OFFICES IN PRINCIPAL CITIES



See the Yarway Exhibit at the Chemical Show,  
Booth 49—New York Colliseum, Nov. 30-Dec. 4

## SHOW DIRECTORY . . .

Renneburg & Sons Co., Edw. . . . 1078  
 \*Stokes Corp., F. J. . . . . 38 & 67

### DRYERS, CENTRIFUGAL

American Tool & Machine Co. . . . 862  
 \*Baker Perkins, Inc. . . . . 560 & 609  
 \*Bird Machine Co. . . . . 685  
 Blaw-Knox Co. . . . . 581  
 Hetherington & Berner, Inc. . . . 1100  
 \*Pfaudler Permutit, Inc. . . . 110 & 141  
 Scientific Glass Apparatus Co.,  
 Inc. . . . . 332  
 \*Sharples Corp. . . . . 485  
 \*Tolhurst Centrifugals Div., Amer-  
 ican Machine and Metals, Inc. . . 506

### DRYING MACHINERY AND EQUIPMENT

Abbe', Inc., Paul O. . . . . 984  
 \*Allis-Chalmers Mfg. Co. . . . . 636  
 Alsop Engineering Corp. . . . . 381  
 \*Baker Perkins Inc. . . . . 560 & 609  
 Bartlett & Snow Co., C. O. . . . 569  
 Blaw-Knox Co. . . . . 581  
 Blickman, Inc., S. . . . . 325  
 \*Bowen Engineering, Inc. . . . . 706  
 Bragar Co., Inc., Norman. . . 1230-1232  
 Bryant Mfg. Co. . . . . 1089  
 \*Carrier Conveyor Corp. . . . . 127  
 Carver, Inc., Fred S. . . . . 90  
 Cleveland Mixer Co. . . . . 1067-1069  
 \*Combustion Engineering, Inc.,  
 Raymond Div. . . . . 646  
 Colton Co., Arthur. . . . . 50  
 \*Davenport Machine & Foundry  
 Co. . . . . 818  
 Dean Products, Inc. . . . . 184  
 Denver Equipment Co. . . . . 1146  
 \*Devine Mfg. Co., J. P. . . . . 1372

\*Fluid Energy Processing & Equip-  
 ment Co. . . . . 813  
 \*Fuller Co. . . . . 446  
 \*General American Transportation  
 Corp. . . . . 435-436-442-446-495  
 Glascote Products, Inc. . . . . 596  
 \*Hardinge Co., Inc. . . . . 582  
 \*Jeffrey Mfg. Co. . . . . 97  
 \*Kennedy-Van Saun Mfg. &  
 Engrg. Corp. . . . . 1036  
 \*Koaline-Sanderson Engineering  
 Corp. . . . . 1307-1309  
 Link-Belt Co. . . . . 165  
 Mazzoni, G., S. P. A. . . . . 1412  
 National Drying Machinery Co. . 1112-  
 1114  
 \*Nichols Engineering & Research  
 Corp. . . . . 624  
 North-Erie & American Process  
 Equipment Div., National-U. S.  
 Radiator Corp. . . . . 850  
 Patterson Foundry and Machine  
 Co. . . . . 154  
 \*Patterson-Kelley Co., Inc. . . 188 & 215  
 \*Pfaudler Permutit, Inc. . . . 110 & 141  
 "Peatecoil" Div., Tranter Mfg.  
 Inc. . . . . 1206-1208-1210  
 Posey Iron Works, Inc. . . . . 1407  
 Proctor & Schwartz, Inc. . . . 684  
 Renneburg & Sons Co., Edw. . . 1078  
 \*Sargent's Sons Corp., C. G. . . 1375-  
 1377  
 \*Sales Corp. of America . . . . 979-981  
 \*Sharples Corp. . . . . 485  
 Standard Steel Corp. . . . . 153  
 \*Stokes Corp., P. J. . . . . 38 & 67  
 Trinity Equipment Corp. . . . . 1392  
 Wilnot Castle Co. . . . . 1033

### DUST AND FUME COLLECTING SYSTEMS

American Air Filter Co., Inc. . . 676  
 \*Barnebey-Cheney Co. . . . . 52

Bartlett & Snow Co., C. O. . . . 569  
 Centrifix Corp. . . . . 1180  
 Croll-Reynolds Co., Inc. . . . . 1054  
 Colonial Plastics Mfg. Co. . . . 1283  
 Day Co. . . . . 45  
 De Bothezat Fans Div., American  
 Machine and Metals, Inc. . . . 556  
 \*Dracoo Div. of Fuller Co. . . . 495  
 \*Ducon Co., Inc. . . . . 990-992  
 \*Duralab Equipment Corp. . . . 359  
 Dustex Corp. . . . . 1299-1301  
 \*Fluid Energy Processing &  
 Equipment Co. . . . . 813  
 \*Fuller Co. . . . . 446  
 \*General American Transportation  
 Corp. . . . . 435-436-442-446-495  
 Hal Process Equipment Corp. . . 1305  
 \*Havig Industries, Inc. . . . . 546  
 Industrial Plastic Fabricators,  
 Inc. . . . . 1102  
 Industrial Products Engineering  
 Co. . . . . 1259  
 Laboratory Furniture Co. . . . . 309  
 Metalab Equipment Corp., Div.  
 of Norbute Corp. . . . . 356  
 National Dust Collector Corp. . . 695  
 \*Pangborn Corp. . . . . 681  
 Peabody Engineering Corp. . . . 1321  
 \*Pulverizing Machinery Div.,  
 Metals Disintegrating Co., Inc. . 632  
 Renneburg & Sons Co., Edw. . . 1078  
 Schutte & Koerting Co. . . . . 61  
 Schutz-O'Neill Co. . . . . 1028  
 Sly Mfg. Co., W. W. . . . . 73  
 Southwestern Engineering Co. . 1250-  
 1252  
 \*Sprout, Waldron & Co., Inc. . . 846-848  
 \*U. S. Stoneware Co. . . . . 111  
 \*Western Precipitation Corp. . . 1181  
 \*Westinghouse Electric Corp. . . 510  
 Wheelabrator Corp. . . . . 190

### DUST AND SPRAY MASKS

Mine Safety Appliances Co. . . . 14-16

### EJECTORS

\*Artisan Metal Products. . . . . 874  
 Croll-Reynolds Co., Inc. . . . . 1054  
 Ingersoll-Rand Co. . . . . 128  
 National Carbon Co. . . . . 460-470  
 Schutte and Koerting Co. . . . . 61  
 Southwestern Engineering Co. . 1250-  
 1252  
 Worthington Corp. . . . . 545  
 Yeomans Brothers Co. . . . . 1156

### ELECTRONIC EQUIPMENT

\*Allis-Chalmers Mfg. Co. . . . . 636  
 \*American Optical Co., Instrument  
 Div. . . . . 1081  
 Automatic Switch Co. . . . . 847  
 Brailsford & Co., Inc. . . . . 1411  
 Crucible Steel Co. of America. . 1424-  
 1426-1428  
 Exact Weight Scale Co. . . . . 21  
 \*Fairbanks, Morse & Co. . . . 1323-1325-  
 1327  
 Industrial Nucleonics Corp. . . . 1418-  
 1420  
 \*Minneapolis-Honeywell Regulator  
 Co. . . . . 635  
 New Brunswick Scientific Co.,  
 Inc. . . . . 324  
 Perkin Engineering Corp. . . . . 996  
 Radiation Electronics Co., Div. of  
 Comptometer Corp. . . . . 1155-1157

\* For additional information see advertise-  
 ment in this issue and use your Reader Service  
 postcard, p. 247.

A BATCH A MINUTE!

## PRECISION MIXING

from a few pounds to  
 over 16 tons, with

**Daffin**  
 MACLELLAN

**BATCH  
 MIXERS**



Used by industries the world  
 over to mix and/or blend a  
 complete batch of dry, free-  
 flowing ingredients in one-min-  
 ute cycles. Exclusive design  
 prevents material separation or  
 particle breakdown regardless

of densities. Fast loading, un-  
 loading. Easy to clean.

CAPACITIES: 5 qts. to 160  
 cu. ft. Hand and motor driven  
 models. All sizes available in  
 stainless steel, other alloys.

**Daffin** MANUFACTURING COMPANY

INDUSTRIAL DIVISION

3552 NORTH PRINCE STREET, LANCASTER, PENNSYLVANIA



## BULK HANDLING PROBLEMS SOLVED:

the EFFICIENCY of "automation" + the FLEXIBILITY of unit containers =

# TOTE SYSTEM



Compare Tote—a complete, mechanical, automatic bulk handling system based on metal containers plus filling and discharging equipment—with a "push-button" fixed storage bin system. You'll find that Tote offers the advantages you want:

- Compact storage
- Surge capacity between processing and packaging operations
- Accurate and automatic weighing and blending

The labor cost of operating a Tote System is no greater, while the *installation cost of a Tote System is much less.*

IN ADDITION, Tote System retains the flexibility of unit containers:

- *Flexibility in Transportation:* Tote Bins can be shipped by rail or truck, or they can be retained in the plant and filled from bulk hopper cars or trucks.
- *Flexibility in Plant Layout and Procedures:* Tote System can be adapted easily to future requirements. Plant layouts can be changed simply by re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And the Bins can be used interchangeably for different products.

See Tote at Exposition of Chemical Industries, Coliseum, New York City, Nov. 30-Dec. 4. Booths 858-60.

*Why not let our engineers survey your plant at no obligation? Meanwhile, write for new catalog containing complete details.*

## TOTE SYSTEM, INC.

\*Tote and Tote System  
Reg. U.S. Pat. Off.

600 So. 7th, Beatrice, Nebraska

## SHOW DIRECTORY . . .

*Reliance Electric & Engineering Co. . . . .	10
Scientific Glass Apparatus Co., Inc. . . . .	332
Sticht Co., Inc., Herman H. . . . .	1280
*Superior Electric Co. . . . .	804
Synton Co. . . . .	163
*Taylor Instrument Companies. . . . .	104
*Thermo Electric Co., Inc. . . . .	817
Thompson-Ramo-Wooldridge Corp. . . . .	13
Welch Mfg. Co., W. M. . . . .	205
*Westinghouse Electric Corp. . . . .	510

## ELEVATORS

Bartlett & Snow Co., C. O. . . . .	569
Bucket Elevator Co. . . . .	1038
Denver Equipment Co. . . . .	1146
Great Western Mfg. Co. . . . .	216
Howes Co. Inc., S. . . . .	1029
*Jeffrey Mfg. Co. . . . .	97
*Kennedy Van Saun Mfg. & Engrg. Corp. . . . .	1036
Link-Belt Co. . . . .	165
Pressed Steel Tank Co. . . . .	631
Renneburg & Sons Co., Edw. . . . .	1078
*Sprout, Waldron & Co., Inc. . . . .	846-848
*Sturtevant Mill Co. . . . .	421
Synton Co. . . . .	163
*Westinghouse Electric Corp. . . . .	510
Young Machinery Co., Inc., The. . . . .	1087

## EMULSIFIERS

*Allied Chemical Corp. . . . .	955-957-959-961
Armour Industrial Chemical Co. . . . .	932-934
Cleveland Mixer Co. . . . .	1067-1069
Continental Oil Co. . . . .	930
*Day Co., J. H. Div., Cleveland Automatic Machine Co. . . . .	121-122
Gabb Special Products, Inc. . . . .	1106
Gifford-Wood Co. . . . .	219
Industrial Products Engineering Co. . . . .	1259
Lehmann Co. Inc., J. M. . . . .	1429-31-46
*Manton-Gaulin Mfg. Co. Inc. . . . .	51
*Morehouse-Cowles, Inc. . . . .	814
*Premier Mill Corp. . . . .	1391
*Ross & Son Co., Inc., Charles. . . . .	983-985
Scientific Glass Apparatus Co., Inc. . . . .	332
Smith Co., T. L. . . . .	986
Sonic Engineering Corp. . . . .	1122
Tri-Homo Corp. . . . .	214
Victor Chemical Works. . . . .	936-938, 940, 963

## EMULSIONS

*Allied Chemical Corp. . . . .	955-957-959-961
--------------------------------	-----------------

## ENAMELED APPARATUS

*Pfaudler Permutit, Inc. . . . .	110 & 141
----------------------------------	-----------

## ENAMELS

Lead Industries Assn. . . . .	816
*U. S. Stoneware Co. . . . .	111

## ENGINEERS

Bartlett & Snow Co., C. O. . . . .	569
Blaw-Knox Co. . . . .	581

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

*Carrier Conveyor Corp. . . . .	127
*Chemical Construction Corp. . . . .	952
Crawford & Russell, Inc. . . . .	1000
*Dorr-Oliver Inc. . . . .	531
*Frick Co. . . . .	1258-1260
*Fuller Co. . . . .	446
Galigher Co. . . . .	843
Industrial Products Engineering Co. . . . .	1259
*Kennedy Van Saun Mfg. & Engrg. Corp. . . . .	1036
Knapp Mills, Inc. . . . .	175
Lehmann & Co. Inc., J. M. . . . .	1429-1431-1446
Renneburg & Sons Co., Edw. . . . .	1078
*Sharples Corp. . . . .	485
Southwestern Engineering Co. . . . .	1250-1252
Star Tank & Filter Corp. . . . .	233
*U. S. Stoneware Co. . . . .	111
Voss Co., Inc., J. H. H. . . . .	1224

## EVAPORATORS

A.P.V. Company, Inc. . . . .	1302
*Artisan Metal Products. . . . .	874
Bartlett & Snow Co., C. O. . . . .	569
Blaw-Knox Co. . . . .	581
Carbone Corp. . . . .	803
Centrifex Corp. . . . .	1180
Chicago Bridge & Iron Co. . . . .	844
Dean Products, Inc. . . . .	184
Devine Mfg. Co., J. P. . . . .	1372
Downington Iron Works, Inc., Div. of Pressed Steel Tank Co. . . . .	631
*Fansteel Metallurgical Corp. . . . .	617
Fischer & Porter Co. . . . .	496
*Frick Co. . . . .	1258-1260
*General American Transportation Corp. . . . .	435-436-442-446-495
Hunt Machine Co., Rodney. . . . .	1240-1242-1244
Knapp Mills Inc. . . . .	175
Laboratory Glass & Instruments Corp. . . . .	369
Mazzoni, G., S. P. A. . . . .	1412
*National Carbon Co. . . . .	460-470
Niagara Blower Co. . . . .	655
*Pfaudler Permutit, Inc. . . . .	110 & 141
"Platecoil" Div., Tranter Mfg., Inc. . . . .	1206-1208-1210
Pressed Steel Tank Co. . . . .	631
Renneburg & Sons Co., Edw. . . . .	1078
Schutte and Koerting Co. . . . .	61
Scientific Glass Apparatus Co., Inc. . . . .	332
Star Tank & Filter Corp. . . . .	233
Tenso-Lab, Inc. . . . .	1123
*Worthington Corp. . . . .	545
Young Radiator Co. . . . .	1403
Yuba Consolidated Industries, Inc. . . . .	882-884-886

## EXHAUSTERS

*Allis-Chalmers Mfg. Co. . . . .	636
Croll-Reynolds Co., Inc. . . . .	1054
*Day Co., The . . . . .	45
De Bothezat Fans Div., American Machine and Metals, Inc. . . . .	556
*Du Verre, Inc. . . . .	891
*Fuller Co. . . . .	446
General Ceramics Corp. . . . .	131
*Haveg Industries, Inc. . . . .	546
Heil Process Equipment Corp. . . . .	1305
Ingersoll-Rand Co. . . . .	128
Laboratory Furniture Co. . . . .	309
Renneburg & Sons Co., Edw. . . . .	1078
Schutte and Koerting Co. . . . .	61
U. S. Hoffman Machinery Corp. . . . .	1365
*U. S. Stoneware Co. . . . .	111

## EXPLOSIVES

*Allied Chemical Corp. . . . .	955-957-959-961
*Hercules Powder Co. . . . .	916

## EXTRACTION PLANTS

*Artisan Metal Products. . . . .	874
Bartlett & Snow Co., C. O. . . . .	569
Blaw-Knox Co. . . . .	581
*Dorr-Oliver Inc. . . . .	531
Podbielniak, Inc. . . . .	595
Star Tank & Filter Corp. . . . .	233
York Co., Inc., Otto H. . . . .	85

## EXTRACTORS

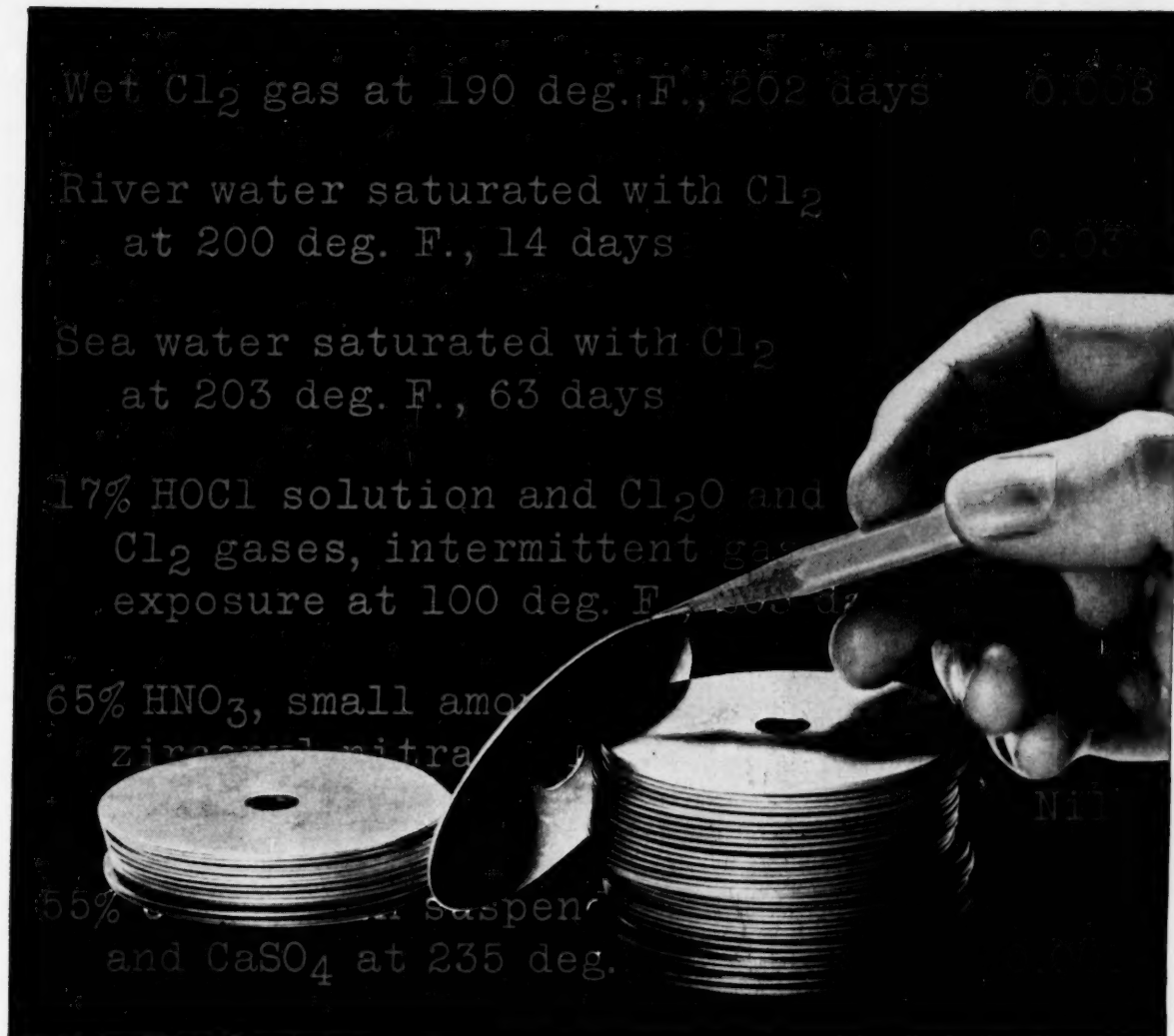
American Tool & Machine Co. . . . .	862
*Artisan Metal Products. . . . .	874
Blaw-Knox Co. . . . .	581
*Bowen Engineering, Inc. . . . .	706
*Centrico, Inc. . . . .	842
Cleveland Miner Co. . . . .	1067-1069
*Devine Mfg. Co., J. P. . . . .	1372
*Dorr-Oliver Inc. . . . .	531
Glascote Products, Inc. . . . .	596
Koven Fabricators, Inc. . . . .	74
Mixing Equipment Co., Inc. . . . .	146
Peerless Mfg. Co. . . . .	1008
Podbielniak, Inc. . . . .	595
Scientific Glass Apparatus Co., Inc. . . . .	332
*Sharples Corp. . . . .	485
Tenso-Lab, Inc. . . . .	1123
Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .	1329-1331
*Tolhurst Centrifugals Div., American Machine and Metals, Inc. . . . .	506
York Co. Inc., Otto H. . . . .	85

## FANS

American Air Filter Co., Inc. . . . .	676
Carey Mfg. Co., Philip. . . . .	1152
De Bothezat Fans, Div. of American Machine and Metals, Inc. . . . .	556
*Dracco Division of Fuller Co. . . . .	495
*Duriron Co., Inc. . . . .	520 & 532
*Du Verre, Inc. . . . .	891
*Fuller Co. . . . .	446
General Alloys Co. . . . .	193
*General American Transportation Corp. . . . .	435-436-442-446-495
*Haveg Industries, Inc. . . . .	546
Heil Process Equipment Corp. . . . .	1305
Industrial Plastic Fabricators, Inc. . . . .	1102
International Process Equipment Co., Inc. . . . .	812
*Kennedy Van Saun Mfg. & Engrg. Corp. . . . .	1036
Renneburg & Sons Co., Edw. . . . .	1078
*Sprout, Waldron & Co., Inc. . . . .	846-848
Young Machinery Co., Inc., The. . . . .	1087

## FEEDERS

B-I-F Industries, Inc. . . . .	660
Bartlett & Snow Co., C. O. . . . .	569
Bucket Elevator Co. . . . .	1038
*Carrier Conveyor Corp. . . . .	127
Cleveland Vibrator Co. . . . .	993-995
*Dracco Div. of Fuller Co. . . . .	495
*Eriez Mfg. Co. . . . .	909-911
Exact Weight Scale Co. . . . .	21
*Fuller Co. . . . .	446
Galigher Co. . . . .	843
*General American Transportation Corp. . . . .	435-436-442-446-495
Gump Co., B. F. . . . .	1024-1026
Hapman Conveyors, Inc. . . . .	1358
*Hardinge Co., Inc. . . . .	582
*Jeffrey Mfg. Co. . . . .	97
*Kennedy Van Saun Mfg. & Engrg. Corp. . . . .	1036
Link-Belt Co. . . . .	165
Norcross Companies, Sterling E. . . . .	991
*Prater Pulverizer Co. . . . .	904-906
Proctor & Schwartz, Inc. . . . .	684
Pulva Corp. . . . .	220



## One of the most comprehensive tests undertaken confirms titanium's outstanding corrosion resistance

Encouraged by increasing availability (and lowering costs) of titanium, more and more designers of process industry equipment are testing and applying its unique corrosion resistance and other properties.

One of the most extensive evaluations ever made, with actual chemical plant exposures, was a seven-plant series of tests by Columbia-Southern Chemical Corporation. The tests, covering 2300 specimens of 40 ma-

terials involved many environments.

Test results led Columbia-Southern to broaden use of titanium in actual equipment such as valves, heating coils, nitric acid reboilers... in their most corrosive media. In service for nearly a year, the equipment has confirmed the earlier findings.

The detailed results of this test are well worth your study. Write for your copy of a summary report today.

Union Carbide Metals Company,  
Division of Union Carbide Corporation,  
30 East 42nd Street, New York 17, N.Y.

*In Canada -*

Union Carbide Canada Limited, Toronto



**METALS**

**Electromet Brand Ferroalloys**  
and other Metallurgical Products

The terms "Electromet" and "Union Carbide" are registered trademarks of Union Carbide Corporation

*see the new*  
**"G" SERIES**  
**CHARLOTTE**  
**COLLOID**  
**MILLS**  
*industrial*  
*and*  
*sanitary*  
*models*

1 HP. to 125 HP.

**BOOTH**  
**No. 618**

27th EXPOSITION OF  
 CHEMICAL INDUSTRIES  
 NEW YORK COLISEUM

**NOV. 30 — DEC. 4**  
**1959**

MAYONNAISE  
 SALAD DRESSING  
 PHARMACEUTICAL SUSPENSIONS  
 WATERPROOFING COMPOUNDS  
 VINYL EMULSION PAINT  
 TEXTILE PRINT COLORS  
 TEXTILE DYE COLORS  
 LUBRICATING GREASE  
 ASPHALT EMULSIONS  
 PAPER COATINGS  
 COSMETICS

for complete  
 information call or write

**CHEMICOLLOID**  
**LABORATORIES INC.**

55 HERRICKS ROAD,  
 GARDEN CITY PARK,  
 L.I., N.Y.

**SHOW DIRECTORY . . .**

Renneburg & Sons Co., Edw. . . . .1078  
 \*Richardson Scale Co. . . . .1151-1153  
 \*Sargent's Sons Corp., C. G. 1375-1377  
 Schutz-O'Neill Co. . . . .1028  
 Southwestern Engineering Co. 1250-1252  
 \*Sprout, Waldron & Co., Inc. .846-848  
 Syntrol Co. . . . .163  
 Vibra Screw Feeders, Inc. 1138-1142  
 Vibro Plus Products, Inc. . . . .1393  
 \*Wallace & Tiernan, Inc. . . . .686  
 Young Machinery Co., Inc. . . . .1087

**FILLERS**

Allied Chemical Corp. . . . .955-957-959-961  
 \*Aluminum Company of America 559  
 \*Brown Co. . . . .923  
 Eagle-Picher Co. . . . .1187-1169  
 Minerals & Chemicals Corp. of America . . . . .950  
 Quaker Oats Co., Chemicals Div. 953  
 Titanium Alloy Mfg. Div., National Lead Co. . . . .234

**FILLING MACHINES**

Bemis Bro. Bag Co. . . . .164-166  
 Black Products Co. . . . .1319  
 Chemical & Pharmaceutical Industry Co., Inc. . . . .1064  
 Cherry-Burrell Corp. . . . .1039-1045-1049  
 Colton Co., Arthur Div., Snyder Corp. . . . .50  
 Ertel Engineering Corp. . . . .623  
 Glengarry Processes, Inc. . . . .60  
 Gump Co., B. F. . . . .1024-1026  
 Mettler Instrument Corp. . . . .339  
 \*Pfaudler Permutit, Inc. . . . .110 & 141  
 \*Richardson Scale Co. . . . .1151-1153  
 Scientific Glass Apparatus Co., Inc. . . . .332

**FILTER AIDS**

Alsop Engineering Corp. . . . .381  
 American Plant Equipment Co. 1282-1284  
 \*Barnebey-Cheney Co. . . . .52  
 \*Brown Co. . . . .923  
 \*Eagle-Picher Co. . . . .1187-1169  
 Great Lakes Carbon Corp., Dicalite Dept., Electrode Div. . . . .204  
 Hercules Filter Corp. . . . .213  
 \*Johns-Manville Sales Corp. 172-176  
 Republic Seitz Filter Corp. . . . .977  
 Scientific Glass Apparatus Co., Inc. . . . .332  
 West Virginia Pulp & Paper Co., Industrial Chemical Sales Div. . . . .924-926

**FILTER CLOTH**

Alsop Engineering Corp. . . . .381  
 American Plant Equipment Co. 1282-1284  
 Brown & Co., J. G. . . . .1093  
 \*Eimco Corp. . . . .80  
 Filtration Fabrics, Div. of American Machine and Metals, Inc. 556  
 Komline-Sanderson Engineering Corp. . . . .1307-1309  
 \*Multi-Metal Wire Cloth Co., Inc. 191  
 \*National Filter Media Corp. . . . .1113  
 Scientific Glass Apparatus Co., Inc. . . . .332  
 \*Shriver & Co., Inc., T. . . . .473  
 \*Sperry & Co., D. R. . . . .1362

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

**FILTER CLOTH, METALLIC**

American Plant Equip. Co. 1282-1284  
 Buffalo Wire Works Co., Inc. 1381  
 \*Eimco Corp. . . . .80  
 Hercules Filter Corp. . . . .213  
 Micro Metallic Div., Pall Corp. 1012-1014  
 \*Multi-Metal Wire Cloth Co., Inc. 191  
 Newark Wire Cloth Co. . . . .183  
 Southwestern Engineering Co. 1250-2  
 Tyler Co., W. S. . . . .574

**FILTER PAPER**

Alsop Engineering Corp. . . . .381  
 \*Eaton-Dikeman Co. . . . .1120  
 Ertel Engineering Corp. . . . .623  
 Filtration Fabrics Div., American Machine and Metals, Inc. . . . .556  
 General Laboratory Supply Co. 310  
 Hercules Filter Corp. . . . .213  
 Jacoby-Tarbox Corp. . . . .1362  
 \*National Filter Media Corp. . . . .1113  
 Republic Seitz Filter Corp. . . . .977  
 Scientific Glass Apparatus Co. 332  
 \*Shriver & Co., Inc., T. . . . .473  
 \*Sparkler Mfg. Co. . . . .56  
 Star Tank & Filter Corp. . . . .233  
 Tenso-Lab., Inc. . . . .1123  
 Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .1329-1331  
 Welch Mfg. Co., W. M. . . . .205

**FILTERS**

\*Adams Co., Inc., R. P. . . . .836  
 American Air Filter Co., Inc. . . . .676  
 American Plant Equip. Co. 1282-1284  
 American Tool & Machine Co. . . . .862  
 B-I-F Industries, Inc. . . . .660  
 \*Barnebey-Cheney Co. . . . .52  
 Barnstead Still and Sterilizer Co. 416  
 Beckley, Haltom & Hickman. . . . .1342-1363  
 \*Bird Machine Co. . . . .685  
 Bishop & Co., Platinum Works, J. 900-902  
 Blickman, Inc., S. . . . .325  
 Brown & Co., J. G. . . . .1093  
 Carver, Inc., Fred S. . . . .90  
 Chem Flow Corp. . . . .1227  
 Chicago Bridge & Iron Co. 844-1390  
 \*Commercial Filters Corp. . . . .223  
 \*Corning Glass Works. . . . .134  
 Croll-Reynolds Engineering Co., Inc. . . . .1054  
 Day Co. . . . .45  
 Denver Equipment Co. . . . .1146  
 \*Dorr-Oliver Inc. . . . .531  
 \*Dracco Div. of Fuller Co. . . . .495  
 \*Duriron Co., Inc. . . . .520 & 532  
 \*Eimco Corp. . . . .80  
 Ertel Engineering Corp. . . . .623  
 Filtration Engineers Div., American Machine and Metals, Inc. . . . .456  
 Filterite Corp. . . . .1303  
 Filtros Inc. . . . .854-856  
 Flanders Filters, Inc. . . . .937  
 \*Fuller Co. . . . .446  
 Galigher Co. . . . .843  
 \*Hardinge Co., Inc. . . . .582  
 Hercules Filter Corp. . . . .213  
 Hungerford & Terry, Inc. 1164-1166  
 Industrial Filter & Pumping Mfg. Co. . . . .1188-1202  
 Jacoby-Tarbox Corp. . . . .1362  
 Knight Co., Maurice A. . . . .586  
 \*Komline-Sanderson Engineering Corp. . . . .1307-1309  
 Micro Metallic Div., Pall Corp. 1012-1014  
 \*Multi-Metal Wire Cloth Co., Inc. 191  
 Nalge Co., Inc. . . . .1201  
 Newark Wire Cloth Co. . . . .183  
 Niagara Filters Div., American Machine and Metals, Inc. . . . .506



At last

# ABSOLUTE SAFETY

COMPLETE CORROSION RESISTANCE

is now available with

FRP\* Armoring

- Corrosion Resistance Inside and Out
- High Impact Resistance
- Low Maintenance Costs
- Elimination of Personnel Hazards



## WILL NOT BURST!

*a complete corrosion system  
built into an armored pipe.*

\*Fiberglass Reinforced Plastic

Here at last is the ultimate in resistance with the maximum in safety. Haveg FRP\* Armoring now permits the use of Haveg pipe and fittings in many new applications. It is also available for use with fume duct, tanks, towers or wherever strength requirements have previously ruled out the use of plastic equipment. We invite your inquiries.

BOOTH 546 CHEMICAL SHOW—NEW YORK

**HAVEG**

**HAVEG INDUSTRIES, INC.**

900 GREENBANK ROAD • WILMINGTON 8, DELAWARE

## SHOW DIRECTORY . . .

North-Erie & American Process Equipment Div., National-U. S. Radiator Corp. ....	850
*Norton Co. ....	1289-1291
No Vo Div., Industrial Enterprises, Inc. ....	1030
Peerless Mfg. Co. ....	1008
Process Filters Div., Bowser, Inc. ....	1115
Purolator Products, Inc. ....	15
*Read Standard Div., Capitol Products Corp. ....	162
Republic Seitz Filter Corp. ....	977
Scientific Class Apparatus Co., Inc. ....	332
*Selas Corp. of America. ....	979-981
*Sharples Corp. ....	485
*Shriver & Co., Inc., T. ....	473
*Sly Mfg. Co., W. W. ....	73
*Sparkler Mfg. Co. ....	56
*Sperry & Co., D. R. ....	1362
Star Tank & Filter Corp. ....	233
Terriss Div., Consolidated Siphon Co., Inc. ....	1329-1331
Trinity Equipment Corp. ....	1392
United States Filter Co. ....	1139-1141
.....	1143
*U. S. Stoneware Co. ....	111
*Western Precipitation Corp. ....	1181
Wheelabrator Corp. ....	190

### FIRE DETECTION

Edison Industries, E. A. Instrument Div., McGraw-Edison Co. ....	945
Falcon Alarm Co. ....	1343-45-47-49
Fenwal Inc. ....	890-892
Rockwood Sprinkler Co., Div. of Gamewell Co. ....	1238-1271-1272-1273

### FIRE EXTINGUISHERS

Ansul Chemical Co. ....	95
*Protectoseal Co. ....	1286
Rockwood Sprinkler Co., Gamewell Co. ....	1238-1271-1272-1273
Welch Mfg. Co., W. M. ....	205

### FIRE PROOFING COMPOUNDS

*Allied Chemical Corp. ....	955-957-959-961
Eagle-Picher Co. ....	1167-1169
Great Lakes Carbon Corp., Dicalite Dept., Electrode Div. ....	204
*Hercules Powder Co. ....	916
Michigan Chemical Corp. ....	942
U. S. Borax & Chemical Corp. ....	918-920
Victor Chemical Works. ....	936-938, 940-963

### FITTINGS

A.P.V. Company, Inc. ....	1302
*Aeroquip Corp. ....	1255
Alloy Products Corp. ....	1205
*Babcock & Wilcox Co., Tubular Products Div. ....	1002-1004-1006
Beckley, Haltom & Hickman. ....	1342-1363
Cherry-Burrell Corp. ....	1039-1045-1049
*Chiksan Co., A Subsidiary of Food Machinery & Chemical Corp. ....	1268-1270
Colonial Plastics Mfg. Co., The. ....	1283
Crawford Fitting Co. ....	987-989
*Devine Manufacturing Co., J. P. ....	1372

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Duriron Co., Inc., The. ....	520-532
Ethylene Corp. ....	971
Falls Industries, Inc. ....	131
Fibercast Co. Div., Youngstown Sheet & Tube Co. ....	870
Flowline Corp. ....	805
*Frick Co. ....	1258-1260
Glascote Products, Inc. ....	596
*Grinnell Co., Inc. ....	566
*Haveg Industries, Inc. ....	546
High Pressure Equipment Co., Inc. ....	1215-1217
Imperial Brass Mfg. Co., The. ....	894-896
Knapp Mills, Incorporated. ....	175
Ladish Co. ....	63
Lead Lined Pipe Co. ....	70
Nalge Co., Inc., The. ....	1201
Parker Fittings & Hose Div., Parker-Hannifin Corp. ....	431
Parks-Cramer Co. ....	55
*Pfaudler Permutit, Inc. ....	110 & 141
Potts Co., Horace T., Speedline Fittings Div. ....	980
*Resistoflex Corp. ....	893-895-897
Rockwood Sprinkler Co., Div. of The Gamewell Co. ....	1238-1271-1272-1273

Scientific Glass Apparatus Co., Inc. ....	332
Speedline Fittings Div., Horace T. Potts Co. ....	980
Terriss Div., Consolidated Siphon Supply Co., Inc. ....	1329-1331
*Tube Turns, Div. of Chemtron Corp. ....	98
Tube Turns Plastics, Inc. ....	96
Victaulic Co. of America. ....	1190-1192
*Vogt Machine Co., Henry. ....	124
Walworth Co. ....	26
*Waukesha Foundry Co. ....	1387-1389

### FLOORING

Carey Mfg. Co., Philip. ....	1152
*Johns-Manville Sales Corp. ....	172-176
Nukem Products, Inc. ....	1072
U. S. Stoneware Co. ....	111

### FOOD INDUSTRIES EQUIPMENT

Alsop Engineering Corp. ....	381
American Plant Equipment Co. ....	1281-1284
American Sterilizer Co. ....	366
American Tool & Machine Co. ....	862
*Artisan Metal Products. ....	874
B-I-F Industries, Inc. ....	660
Bemis Bro. Bag Co. ....	164-166
Blaw-Knox Co. ....	581
Blickman, Inc., S. ....	325
Bucket Elevator Co. ....	1038
Carver, Inc., Fred S. ....	90
Cherry-Burrell Corp. ....	1039-1045-1049
Cleveland Mixer Co. ....	1067 1069
Cornell Machine Co. ....	1212
Coulter Industrial Sales Co. ....	1444
*Day Co., J. H. Div. Cleveland Automatic Machine Co. ....	121-122
*Dean Brothers Pumps, Inc. ....	1245-1247-1249
Dean Products, Inc. ....	184
De Laval Separator Co. ....	94
*Dorr-Oliver Inc. ....	531
*Eimco Corp. ....	80
Entoleter Div., Safety Industries, Inc. ....	1599
Fitzpatrick Co., W. J. & Fitzpatrick Corp. ....	64
*Fuller Co. ....	446
*General American Transportation Corp. ....	435-436-442-446-495
Gifford-Wood Co. ....	219
Glengarry Processes, Inc. ....	60
Great Western Mfg. Co. ....	216
Gump Co., B. F. ....	1024-1026
Howes Co., Inc., S. ....	1029

Hockmeyer & Co., Herman. ....	1178
Hunt Machine Co., Rodney. ....	1240-1242-1244

International Process Equipment Co., Inc. ....	812
Jacoby-Tarbox Corp. ....	1362
Lawrence Pumps, Inc. ....	852
Lead Lined Iron Pipe Co. ....	70
Lee Metal Products Co., Inc. ....	1384
Lehmann Co., Inc., J. M. ....	1429-1431-1446
McIntosh Equipment Corp. ....	1343-45 47-49
*Metal Cladding, Inc. ....	1378
*Morehouse-Cowles, Inc. ....	814
Nichols Engineering & Research Corp. ....	624
North-Erie and American Process Equipment Div., National-U. S. Radiator Corp. ....	850
*Patterson-Kelley Co., Inc. ....	188 & 215
*Pfaudler Permutit, Inc. ....	110 & 141
Podbielniak, Inc. ....	595
*Premier Mill Corp. ....	1391
*Proctor & Schwartz, Inc. ....	684
Renneburg & Sons Co., Edw. ....	1078
Rietz Mfg. Co. ....	1231
*Robertshaw-Fulton Control Co., Aeronautical & Instrument Div. ....	1366-1368

RKL Controls, Inc. ....	1405
Sharples Corp. ....	485
Simon-Carter Co. ....	1096
Sonic Engineering Corp. ....	1122
Southwestern Engineering Co. ....	1250-1252
*Sperry & Co., D. R. ....	1362
Stainless Products Corp. ....	1158
Star Tank & Filter Corp. ....	233
*Strong-Scott Mfg. Co. ....	1274-1276-1278

*Taylor Instrument Companies. ....	104
Terriss Div., Consolidated Siphon Supply Co., Inc. ....	1329-1331
Tri-Homo Corp. ....	214
Tri-Rotor, Inc. ....	1439
*Tube Turns, Div. of Chemtron Corp. ....	98
Tube Turns Plastics, Inc. ....	96
Vac-U-Max ....	1195-1197
Vibra Screw Feeders, Inc. ....	1138-1142
Voss Co., Inc., J. H. H. ....	1224
Yeomans Brothers Co. ....	1156

### FURNACES AND ACCESSORIES

American Gas Furnace Co. ....	833
Bragar Co., Inc., Norman. ....	1230-1232
Dean Products, Inc. ....	184
Electric Hotpack Co., Inc. ....	373-375
*General American Transportation Corp. ....	435-436-442-446-495
Laboratory Equipment Corp. ....	905
National-U. S. Radiator Corp. ....	850
New York Laboratory Supply Co., Inc. ....	1022
Nichols Engineering & Research Corp. ....	624
*Parke-Cramer Co. ....	55
Peabody Engineering Corp. ....	1321
Posey Iron Works, Inc. ....	1407
Renneburg & Sons Co., Edw. ....	1078
Scientific Glass Apparatus Co., Inc. ....	332
*Selas Corp. of America. ....	979-981
Tenso-Lab., Inc. ....	1123
Trent, Inc. ....	195

### GAGES

Consolidated Vacuum Corp. ....	1353
--------------------------------	------

### GAGES

Autoclave Engineers ....	346
Bailey Meter Co. ....	46

Code number for  
this advertisement  
341 ➔

• A chemical pump with  
full mechanical reliability  
AND corrosion resistance  
... AT LOW FIRST COST!



## Presenting **DEAN BROTHERS** Type "pH" Chemical Pumps

● This new, engineered line of pumps was designed by you, and more than 19,000 process and plant engineers like you, to provide the maximum in corrosion resistance, mechanical reliability, performance and flexibility of application at lowest initial cost.

**For the Process Engineer:** Versatility—28 pump sizes, 14 horizontal and 14 vertical, furnished in 14 corrosion resistant alloys provide the best pump for your application at *lowest initial cost*.

**For the Plant Engineer:** Simple, economical *installation* with centerline suction and discharge connections. Simple, economical *operation* designed for long service life with fully open impellers for slurries and clear

liquids. Simple, economical *maintenance*—pump is easily serviced without removing from suction or discharge piping . . . plus maximum interchangeability of parts. "pH" pumps are *lowest cost in the long run*.

See the "pH" pump in action. Visit booth 1245, 1247 and 1249 at the Chem Show. Simulate your process conditions and watch the results on a closed-circuit TV Screen as they are graphically plotted by electronic recorder.

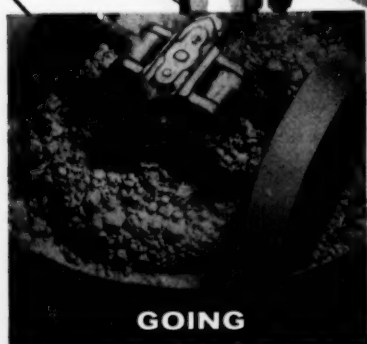


**DEAN BROTHERS PUMPS INC.**

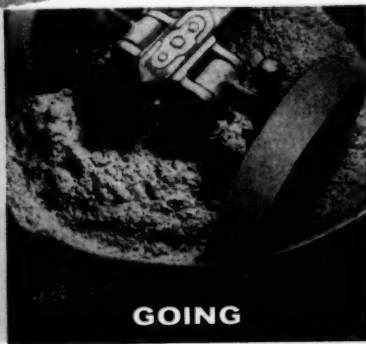
INDIANAPOLIS 7, INDIANA

*The Best Is Our Standard*

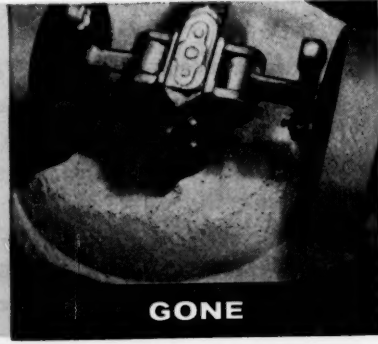
# At the New York Chemical



**GOING**



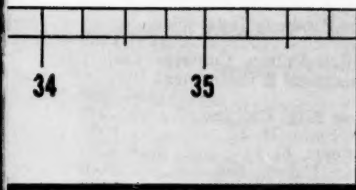
**GOING**



**GONE**



# Show...



## TAKE A YARDSTICK TO CONTROLLED DISPERSION



■ In this era of expensive high purity, high uniformity materials, it takes a lot of mixer to lay claim to cost reductions. A machine that can help eliminate reprocessing and remixing, slash waste and rejects by the simple expedient of making the most of prepared ingredients, can turn problem mixing operations into profit opportunities.

*You don't believe it!* It's well that you shouldn't. Because no mixer can be all things to *all* processes. That's why we say only this of the Simpson Mix-Muller: *If you mix dry or semi-dry solid materials, yours is a process that suffers most from wasteful blending practice . . . but, it is also a process that can profit most from controlled dispersion.*

We would like to take the face-to-face opportunity to show you *why* at the Chemical Show. Why not come in? Tell us you're from Missouri! And *take a yardstick to controlled dispersion.*

*Write for the new Handbook on Mulling.*

**SIMPSON MIX-MULLER® DIVISION**

**NATIONAL ENGINEERING COMPANY**

636 Machinery Hall Building • Chicago, Illinois



**SEE MULLING DEMONSTRATED!**

**Booth 695,**

**New York 27th Exposition**

**of Chemical Industries,**

**Nov. 30 to Dec. 4**

**NEW...**

**SEE NATIONAL**

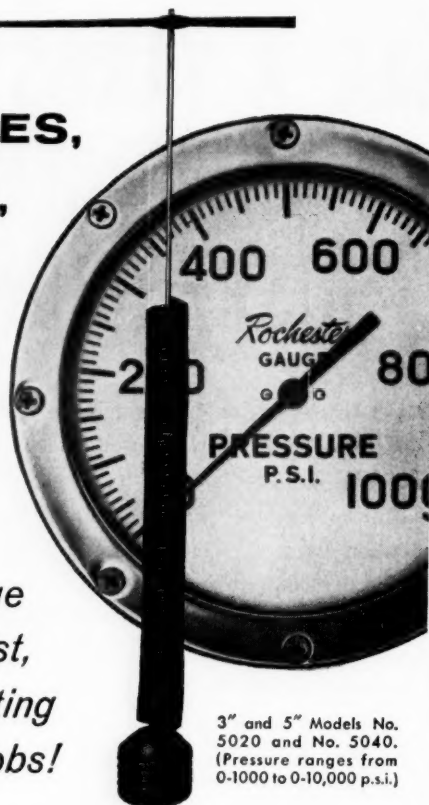
*Air* **CONVEYOR  
SYSTEM**

**IN OPERATION**

**Revolutionary New ROCHESTER HIGH PRESSURE GAUGE**  
has pointer connected directly to pressure element

**NO LINKAGES,  
NO PIVOTS,  
NO GEARS**  
to wear,  
waver  
or lag

*This is the gauge  
for your toughest,  
your most exacting  
high pressure jobs!*



3" and 5" Models No.  
5020 and No. 5040.  
(Pressure ranges from  
0-1000 to 0-10,000 p.s.i.)

Now you can practically eliminate maintenance, replacement, and gauge failures—even under the most severe of high pressure service conditions. The new RMC Gauge, models 5020 and 5040, actually approaches the reliability and dependability of the fittings and valves used in pressure equipment.

It is the first pressure gauge to have the pointer directly connected to the pressure element, without linkage or pivots, and with no gears or hair springs.

The pressure element is a multiple turn bourdon coil, to which the pointer is permanently attached at one end. As pressure increases, the end of the coil rotates, moving the pointer with it.

The bourdon coil is made from small diameter tubing. Therefore, the pressure forces against the coil are reduced; the mechanical stress on the coil is less; and spring life, cycling life, overpressure, and endurance are all vastly higher than the conventional "C" type bourdon tube gauge.

For safety, long cycling life and continued accuracy under extreme conditions of overload pressures, high vibration, shock and line pulsation, the new RMC High Pressure Gauge is the one complete answer. Available in pressure ranges from 0-1000 to 0-10,000 p.s.i.; dial diameters 1½", 2", 3" and 5". (1½" and 2" models are eccentric pivot-drive types.)

Write, wire or phone for complete information.



**ROCHESTER MANUFACTURING CO., INC.**  
113 Rockwood Street, Rochester 10, N. Y.

LIQUID LEVEL, TEMPERATURE and PRESSURE INSTRUMENTS

REPRESENTATIVES IN ALL PRINCIPAL CITIES

**SHOW DIRECTORY . . .**

Cameron Iron Works, Inc.	1062
Consolidated Vacuum Corp.	1353
Hastings-Raydist, Inc.	1020
Industrial Nucleonics Corp.	1418-1420
Jacoby-Tarbox Corp.	1362
*Jerguson Gage & Valve Co.	1211-1213
Precision Thermometer & Instrument Co.	1401
Pressure Products Industries, Inc.	1367-1369
*Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div.	1366-1368
*Rochester Mfg. Co., Inc.	943
Seavy & Sons, M. J.	1071
Stokes Corp., F. J.	38 & 67
*Strahman Valves, Inc.	815
Tenso-Lab, Inc.	1123
Tertrice Co., H. O.	1287
Uehling Instrument Co.	364
*Wallace & Tiernan, Inc.	686
Welch Mfg. Co., W. M.	205
*Yarnall-Waring Co.	49

**GAS BOOSTERS**

American Instrument Co., Inc.	445
*Fuller Co.	446
Ingersoll-Rand Co.	128
Pressure Products Industries, Inc.	1367-1369
Schutte and Koerting Co.	61
U. S. Hoffman Machinery Corp., Air Appliance Div.	1365
Yeomans Brothers Co.	1156

**GAS DIFFUSION MACHINERY**

*Chemineer, Inc.	1220
Denver Equipment Co.	1146
Gabb Special Products, Inc.	1106
Galigher Co.	843
*General American Transportation Corp.	436-442-446-495
International Process Equipment Corp.	812
Mixing Equipment Co., Inc.	146
New England Tank & Tower Co.	79
Patterson Foundry & Machine Co.	154
Philadelphia Gear Corp.	123
Turbo-Mixer Div., General American Transportation Corp.	436-442-446-495
Yeomans Brothers Co.	1156

**GAS HOLDERS**

Chicago Bridge Iron Co.	844
*General American Transportation Corp.	435-436-442-446-495
Koven Fabricators, Inc.	74

**GAS PRODUCERS**

North American Philips Co., Inc., Cryogenics Div.	935
---	-----

**GAS PURIFIERS**

*Adams Co., Inc., R. P.	836
*Allied Chemical Corp.	955-957-959-961
Barnebey-Cheney Co.	52
Blaw-Knox Co.	581
Catalytic Combustion Corp.	1209
Centrifix Corp.	1180
Engelhard Industries, Inc.	192-196
Laboratory Equipment Corp.	905
*North American Philips Co., Inc., Cryogenics Div.	935
Peerless Mfg. Co.	1008
*For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.	

Scientific Glass Apparatus Co., Inc. ....332  
 Tenso-Lab., Inc. ....1123  
 Terriss Div., Consolidated Siphon Supply Co., Inc. ....1329-1331  
 York Co., Inc., Otto H. ....85

#### GASES

\*Allied Chemical Corp. ....955-957-959-961  
 American Messer Corp. ....1083

#### GEARS

\*Jeffrey Mfg. Co. ....97  
 Link-Belt Co. ....165  
 \*Philadelphia Gear Corp. ....123  
 Sier-Bath Gear & Pump Co., Inc. ....806  
 U. S. Electrical Motors, Inc. ....837  
 \*Westinghouse Electric Corp. ....510

#### GENERATORS

\*Allis-Chalmers Mfg. Co. ....636  
 \*Eclipse Fuel Engineering Co. ....973  
 Engelhard Industries, Inc. ....192-196  
 \*Fairbanks, Morse & Co. ....1323-1325-1327  
 Knapp Mills, Inc. ....175  
 Milton Roy Co. ....610  
 National-U. S. Radiator Corp. ....850  
 Southwestern Engineering Co. ....1250-1252  
 \*Westinghouse Electric Corp. ....510

#### GLASS—OPTICAL

\*Corning Glass Works. ....134  
 Engelhard Industries, Inc. ....192-196  
 Lead Industries Assn. ....816  
 Pressure Products Co. ....1409

#### GLASSWARE

Corning Glass Works. ....134  
 \*General Electric Co. ....482  
 General Laboratory Supply Co. ....310  
 Kimble Glass Co. ....309  
 Laboratory Equipment Co. ....905  
 New York Laboratory Supply Co., Inc. ....1022  
 Palo Laboratories Supplies, Inc. ....385  
 Porter Inc., George K. ....1134-1136  
 Rietz Mfg. Co. ....1231  
 Scientific Glass Apparatus Co., Inc. ....332  
 Tenso-Lab., Inc. ....1123  
 Welch Mfg. Co., W. M. ....205

#### GRATING

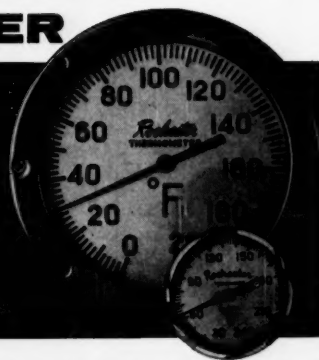
Aluminum Co. of America. ....559  
 Blaw-Knox Co. ....581  
 Welch Mfg. Co., W. M. ....205

#### GRINDERS

Abbé, Inc., Paul O. ....984  
 Airetool Mfg. Co. ....841  
 Alpine American Corp. ....1432-1434  
 Bartlett & Snow Co., C. O. ....569  
 Brabender Instruments, Inc., C. W. ....340  
 Cog Corp., The, Div. of Motiongraph, Inc. ....1388  
 Daffin Mfg. Co. ....1400-1404  
 Denver Equipment Co. ....1146  
 \*Fuller Co. ....446  
 General American Transportation Corp. ....435-436-442-446-495  
 Gifford-Wood Co. ....219  
 Gump Co., B. F. ....1024-1026  
 Ingersoll-Rand Co. ....128  
 Morehouse-Cowles, Inc. ....814  
 Porcelain Div., Ferro Corp. ....154  
 Premier Mill Corp. ....1391  
 Pulva Corp. ....220

## Whenever temperature and performance must go hand in hand SELECT AN RMC THERMOMETER

Available in all scale ranges  
 from  $-150^{\circ}\text{F}$  to  $+1000^{\circ}\text{F}$ ; in dial  
 sizes from 1" to 5"; stem lengths  
 from 2½" to 72" ... with complete  
 adaptability to any installation



Wherever exact knowledge of temperature is an important part of function, you will discover that there are a lot of good reasons for selecting RMC thermometers.

Suppose for instance that you are designing equipment for low temperature work. You know that an RMC thermometer is hermetically *dry-air* sealed so that no ice coating can ever form on the bi-metallic element to stop readings at below freezing temperatures. You can *always* be sure of your low temperature readings.

If severe vibration is a factor, the extra damping of RMC thermometers goes to work to make reading easier, more accurate and to prevent fatigue of the registering element. And when necessary, it can always be easily re-calibrated without opening it or destroying its essential accuracy.



No moisture to freeze the element or fog the dial. RMC thermometers are hermetically *dry-air* sealed then immersion tested for 15 minutes.



No "over" or "under" readings. Re-calibration for extreme accuracy in any range, or necessitated by severe shock, can be done in seconds without breaking seal.



Permanent accuracy with freedom from vibration-caused variable is built in. Silicone damping and special damping bearing minimize vibration and keep shaft alignment true.

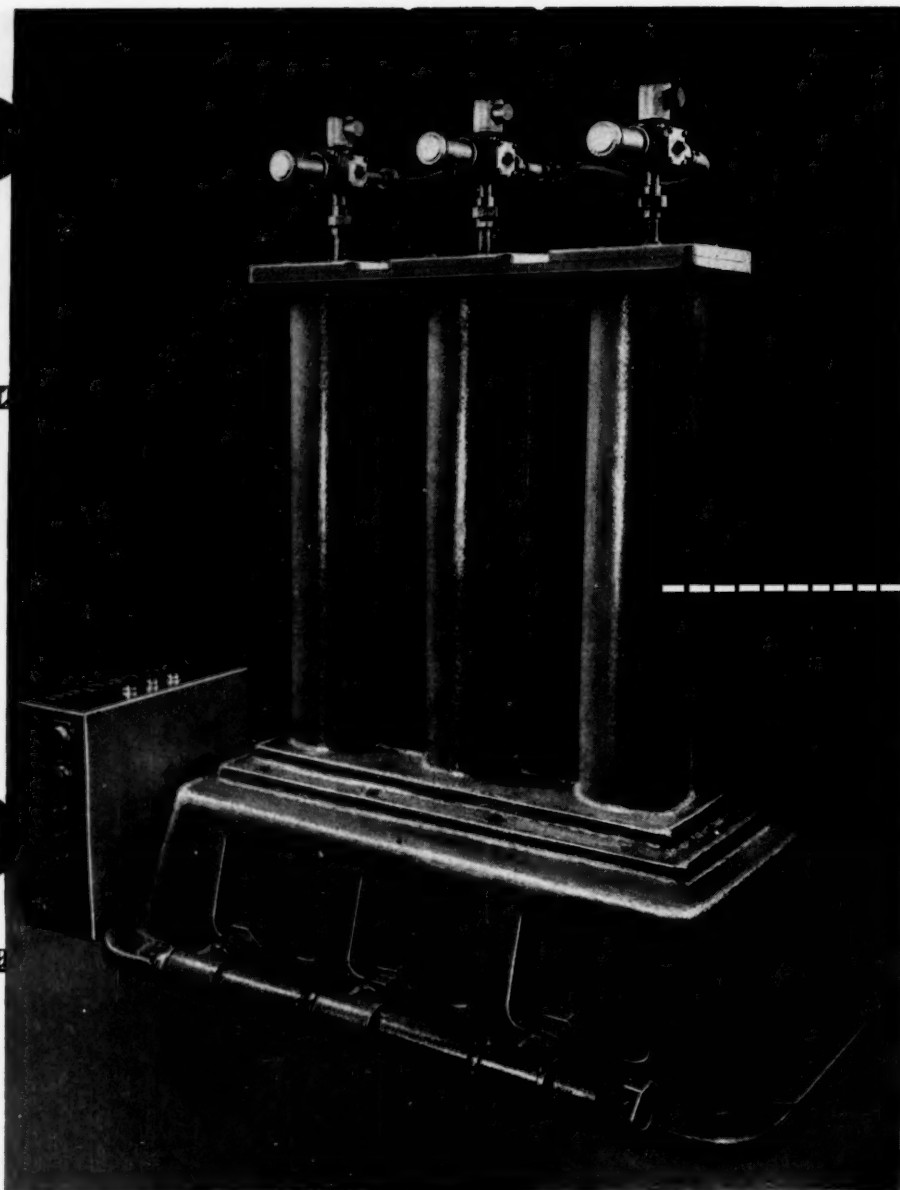
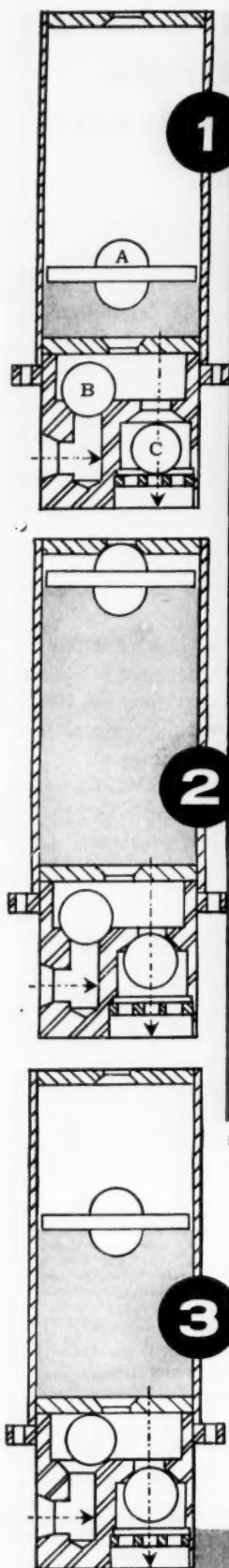
Write, wire or phone for catalog and detailed general specifications. If yours is a special application, tell us your requirements. RMC engineers will work with you in solving it.



ROCHESTER MANUFACTURING CO., INC.  
 113 ROCKWOOD STREET • ROCHESTER 10, N. Y.

LIQUID LEVEL TEMPERATURE AND PRESSURE INSTRUMENTS

REPRESENTATIVES IN ALL PRINCIPAL CITIES



Patent applied for.


### CYLINDERS OPERATE IN 1-2-3 SEQUENCE

- 1 DISCHARGING.** Air from top of cylinder exerts pressure on free-floating piston (a), closes inlet valve (b), and opens outlet valve (c). Piston seats itself at bottom before cylinder is completely emptied to seal air in cylinder.
- 2 WAITING.** Filled cylinder will start emptying just before discharging cylinder stops, insuring a continuous, air-free flow. Timing sequence is set in electrical control panel, which operates automatically from then on.
- 3 FILLING.** Cylinder is being filled by force of gravity. Entire operation and maintenance system is so simple the pump conceivably can be operated forever with no lessening of its 100% positive displacement efficiency.



*Another Crossley First! A true Free-Piston Pump!*

# Pumps anything that Flows!



**Literally runs on air! Has no motor,  
no shaft, seals, packing. No lubrication!**

**ONE PUMP FOR ALL!** Will pump ceramic slip, abrasives, molten metals (up to 2000°F.), acids, syrups, greases, medicines, sludge, mud, milk, concrete, ice cream, plastics, solids in suspension, water from tanks, quarries, lakes—and pump them free of air, without pulsating or surging!

**NON-CONTAMINATING!** Cylinders are 100% stainless steel. Free-floating pistons and ball check valves are steel-hard nylon (for normal temperatures). Pistons drastically minimize air absorption.

**WORKS ANYWHERE!** Set up the electrical automatic control panel in a convenient place, attach an air hose and drop the pump in a lake, tank or settling basin. Install it in an explosives plant, or mine. No safety or relief valves are needed. If a stoppage occurs, the pump stops!

**EASY TO MAINTAIN,** economical to operate. You can stop one cylinder while the other two keep on pumping. Stainless steel sleeves, pistons, valves, can be quickly replaced without shutting down the pump. Power is saved because the pump doesn't operate when there is no demand. And it's noiseless, doesn't vibrate! Jacket and Base are cast iron.

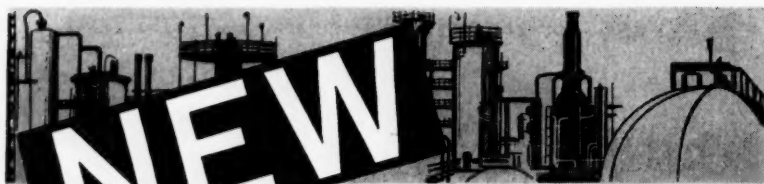
**ANY SIZE YOU WANT!** Capacity of the pump is restricted only by the amount of air pressure available, and the size of the inlets and outlets. Simply state your requirements, we will build a pump to meet them from laboratory size on up. This pump measures 45" x 24" x 53" high.

For more information write Crossley, Pump Dept.

SEE THE PUMP IN OPERATION AT BOOTHS 1423-25 AT THE CHEMICAL SHOW



**THE CROSSLEY MACHINE CO.**  
TRENTON 9, NEW JERSEY



## American 200 Series Chemical Feed Pumps



- METERING ACCURACY OF  $\pm 1\%$
- CAPACITY TO 1624 GPH.

New 200 Series Simplex model can pump up to 812 gph. Duplex model has double this capacity. Maximum pressure of 10,000 psi.

Easy, inexpensive operation is assured by these quality features:

- Self-contained lubrication system — no downtime for lubrication.
- E-Z Clean Cartridge Valves simplify maintenance.
- Interchangeable liquid ends for greatest adaptability in the field.
- Precision screw adjustment on crank for easy accurate stroke regulation.
- Sealed Self-aligning bearings on crank and crosshead withstand greater radial and axial thrust loads.
- Crossheads of hardened and ground steel ride on cast iron.
- Heavy duty reducers.
- NEMA frame motors.

Precision built 200 Series pumps handle a wide variety of "tough," corrosive materials. In Chemical Processing, Refining and Boiler Feed operations, the pumps assure highest accuracy in feeding precisely metered fluids in virtually all ratios, with flow, temperature, pressure, conductivity, PH and other controlled process variables.

Write today for more information.

**AMERICAN<sup>®</sup>**  
**METER COMPANY**  
INCORPORATED ESTABLISHED 1838  
**pump division**  
13500 PHILMONT AVE. PHILADELPHIA 16, PA.



### SHOW DIRECTORY . . .

Pulverizing Machinery Div., Metals Disintegrating Co., Inc.	632
Rietz Mfg. Co.	1231
Ross & Son Co., Inc., Charles	983-985
Schutz-O'Neill Co.	1028
Scientific Glass Apparatus Co., Inc.	332
*Sprout, Waldron & Co., Inc.	846-848
*Strong-Scott Mfg. Co.	1274-1276-1278
*Sturtevant Mill Co.	421
Supreme Div., Franklin P. Miller & Son, Inc.	1010
Torsion Balance Co.	328
Tri-Homo Corp.	214
*U. S. Stoneware Co.	111
*Williams Patent Crusher & Pulverizer Co.	161

### HEAT EXCHANGERS

A.P.V. Co., Inc.	1302
*Adams Co., Inc., R. P.	836
*Aluminum Co. of America	559
American Heat Reclaiming Corp.	1058-1060
*Artisan Metal Products	874
Blaw-Knox Co.	581
Brabender Instruments, Inc., C. W.	340
Brown & Co., J. G.	1093
Carbone Corp.	803
Cherry-Burrell Corp.	1039-1045-1049
*Corning Glass Works	134
Croll-Reynolds Engineering Co.	1054
Dean Products, Inc.	184
*De Laval Separator Co.	94
Distillation Engineering Co.	1048
Downingtown Iron Works, Inc., Div. of Pressed Steel Tank Co.	631
*Duriron Co., Inc.	520 & 532
*Eimco Corp.	80
Falls Industries, Inc.	131
*Fansteel Metallurgical Corp.	617
*Frick Co.	1258-1260
*Fuller Co.	446
Glascote Products, Inc.	596
*Haveg Industries, Inc.	546
Heat Transfer Div., National-U. S. Radiator Corp.	850
Heil Process Equipment Corp.	1305
International Nickel Co., Inc.	509
Knapp Mills Inc.	175
Knight Co., Maurice A.	586
Mazzoni, G. S. P. A.	1412
*National Carbon Co.	460-470
National-U. S. Radiator Corp.	850
Niagara Blower Co.	655
*Patterson-Kelley Co., Inc.	188 & 215
*Pfaudler Permutit, Inc.	110 & 141
"Platecoil" Div., Tranter Mfg., Inc.	1206-1208-1210
Porter Inc., George K.	1134-1136
Pressed Steel Tank Co.	631
Renneburg & Sons Co., Edw.	1078
Rietz Mfg. Co.	1231
Schutte and Koerting Co.	61
Southwestern Engineering Co.	1250-1252
Standard Steel Corp.	153
Star Tank & Filter Corp.	233
Thermon Mfg. Co.	1207
*Vogt Machine Co., Henry	124
*Westinghouse Electric Corp.	510
Wilmet Castle Co.	1033
Young Radiator Co.	1403
Yuba Consolidated Industries, Inc.	882-884-886

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

## HEATERS AND HEATING EQUIPMENT

American Air Filter Co., Inc.	676
American Hydrotherm Corp.	1161
Beckley, Halton & Hickman	1342-1363
*Carrier Conveyor Corp.	127
Catalytic Combustion Corp.	1209
Cherry-Burrell Corp.	1039-1045-1049
*Corning Glass Works	134
Dean Panel Coil Div., Dean Products, Inc.	184
*Eclipse Fuel Engineering Co.	973
Electric Hotpack Co., Inc.	373-375
Engelhard Industries, Inc.	192-196
*Grinnell Co., Inc.	566
*National Carbon Co.	460-470
National Drying Machinery Co.	1112-1114
National-U. S. Radiator Corp.	850
Parks-Cramer Co.	55
*Paterson-Kelley Co., Inc.	188 & 215
*Pfaudler Permutit, Inc.	110 & 141
Pick Manufacturing Co.	1343-45-47
"Platecoil" Div., Tranter Mfg. Inc.	1206-1208-1210
Renneburg & Sons Co., Edw.	1078
Rietz Mfg. Co.	1231
Schutte & Koerting	61
Scientific Glass Apparatus Co., Inc.	332
Selas Corp. of America	979-981
Southwestern Engineering Co.	1250-1252
Trent, Inc.	195
Tyler Co., W. S.	574
U. S. Hoffman Machinery Corp., Air Appliance Div.	1365
Worthington Corp.	545
Yuba Consolidated Industries, Inc.	882-884-886

## HEATING SYSTEMS AND ACCESSORIES

American Hydrotherm Corp.	1161
*Dean Brothers Pumps, Inc.	1245-1247-1249
Dean Panel Coil Div., Dean Products, Inc.	184
*Eclipse Fuel Engineering Co.	973
*Fulton Sylphon Div., Robertshaw-Fulton Controls Co.	1293
*Grinnell Co., Inc.	566
Magnetrol, Inc.	910-912
National-U. S. Radiator Corp.	850
Parks-Cramer Co.	55
Pick Manufacturing Co.	1343-45-47
Renneburg & Sons Co., Edw.	1078
Trent, Inc.	195

## HOISTS

Bartlett & Snow Co., C. O.	569
Elmco Corp.	80
Gifford Wood Co.	219
Ingersoll-Rand Co.	128
Link-Belt Co.	165
Specialty Machinery Corp.	1413-1430
Yuba Consolidated Industries, Inc.	882-884-886

## HOMOGENIZERS

Blickman, Inc., S.	325
Buschman Products, Inc.	1198
Chemical and Pharmaceutical Industry Co., Inc.	1064
Chemicoiloid Laboratories, Inc.	618
Cherry-Burrell Corp.	1039-1045-1049
Cleveland Mixer Co.	1067-1069
Cornell Machine Co.	1212
*Day Co., J. H. Div., Cleveland Automatic Machine Co.	121-122

Fitzpatrick Co., W. J., & Fitzpatco Corp.	64
*Fuller Co.	446
Gabb Special Products, Inc.	1106
Gifford-Wood Co.	219
Hockmeyer & Co., Herman	1178
Industrial Products Engineering Co.	1259
International Process Equipment Co., Inc.	812
McIntosh Equipment Corp.	1343-45-47-49
*Manton-Caulin Mfg. Co., Inc.	51
*Morehouse-Cowles, Inc.	814
New York Laboratory Supply Co., Inc.	1022
*Pfaudler Permutit, Inc.	110 & 141
*Premier Mill Corp.	1391
Rietz Mfg. Co.	1231
*Ross & Son Co., Inc., Charles	983-985
Scientific Glass Apparatus Co., Inc.	332
Sonic Engineering Corp.	1122
Sorvall, Inc., Ivan	342
Supreme Div., Franklin P. Miller & Son, Inc.	1010
Tenso-Lab, Inc.	1123
Tri-Homo Corp.	214

## HOODS, FUME

Alberene Stone, Div. of Georgia Marble Co.	465
Blickman, Inc., S.	325
Browne-Morse Co.	1359
Colonial Plastics Mfg. Co.	1283
Dean Panel Coil Div., Dean Products, Inc.	184
*Duralab Equipment Corp.	359
*Du Verre, Inc.	891
General Alloys Co.	193
Heil Process Equipment Corp.	1305
Industrial Plastic Fabricators, Inc.	1102
Kewaunee Mfg. Co.	398
Knapp Mills, Inc.	175
Laboratory Furniture Co.	309
*Metal Cladding, Inc.	1378
Mine Safety Appliances Co.	14-16
Nalge Co., Inc.	1201
Renneburg & Sons Co., Edw.	1078
Scientific Glass Apparatus Co., Inc.	332
Sheldon Equipment Co., E. H.	336
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331

## HUMIDIFYING APPARATUS

American Instrument Co., Inc.	445
*Armstrong Machine Works	1226
Electric Hotpack Co., Inc.	373-375
Grinnell Co., Inc.	566
Scientific Glass Apparatus Co., Inc.	332
*Spraying Systems Co.	914
Trerice Co., H. O.	1287
*Western Precipitation Corp.	1181

## INDICATORS

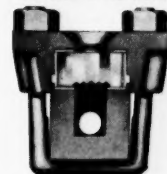
Analytical Measurements, Inc.	314
B-I-F Industries, Inc.	660
*Bailey Meter Co.	46
*Barber-Colman Co., Wheelco Instruments Div.	395
*Brooks Rotameter Co.	998
Cambridge Instrument Co., Inc.	376
Edison Industries, T. A., Instrument Div., McGraw-Edison Co.	945
Engelhard Industries, Inc.	192-196
Fischer & Porter Co.	496
*Foxboro Co., The	519
*Fuller Co.	446
Hastings-Raydist, Inc.	1020
Imperial Brass Mfg. Co.	894-896
Jacoby-Tarbox Corp.	1362

# HIGH PRESSURE GAUGES

USED IN  
REFINERIES  
AND  
CHEMICAL PLANTS  
THROUGHOUT  
THE WORLD



THRU VISION



REFLEX

Single or Multiple  
Sections

TUBULAR

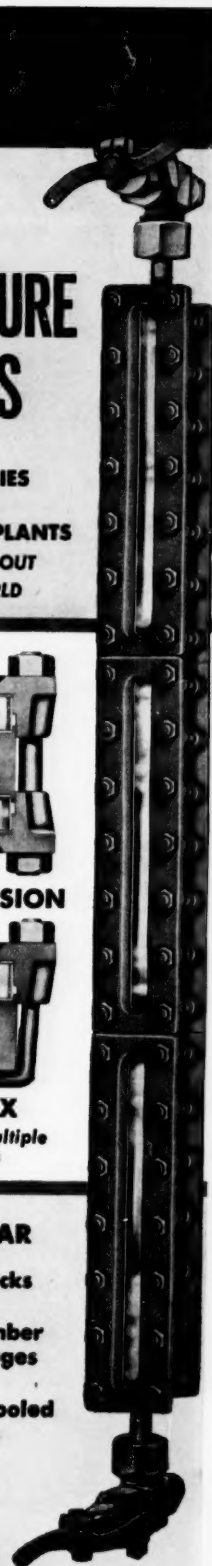
Gauge Cocks

Large Chamber  
Reflex Gauges

Heated or Cooled  
Gauges

SEND FOR  
COMPLETE  
CATALOGUE

STRAHMAN VALVES, Inc.  
NICOLET AVE., FLORHAM PARK, N. J.



## SHOW DIRECTORY . . .

*Jeffrey Mfg. Co. ....	97
Magnetrol, Inc. ....	910-912
Milton Roy Co. ....	610
Mine Safety Appliances Co. ....	14-16
*Pfaudler Permutit, Inc. ....	110 & 141
Potter-Bowser Div., Bowser, Inc. ....	396
Precision Thermometer & Instrument Co. ....	1401
*Robertshaw-Fulton Controls Co., Aeronautical Instrument Div. ....	1366-1368
*Rochester Mfg. Co., Inc. ....	943
Scam Instrument Corp. ....	1230-1232
Schutte and Koerting Co. ....	61
Scientific Glass Apparatus Co., Inc. ....	332
*Taylor Instrument Companies. ....	104
Tenso-Lab., Inc. ....	1123
*Thermo Electric Corp., Inc. ....	817
Trerice Co., H. O. ....	1287
Uehling Instrument Co. ....	364
Walker, Crossweller Co., Ltd. ....	1343-45-47-49
*Yarnall-Waring Co. ....	49

### INSTRUMENTS, OPTICAL

American Instrument Co., Inc. ....	445
American Optical Co., Instrument Div. ....	1081
Beckman Instruments, Inc., Sci- entific & Process Instruments Div. ....	333
Coleman Instruments, Inc. ....	320

\* For additional information see advertise-  
ment in this issue and use your Reader Service  
postcard, p. 247.

New York Laboratory Supply Co., Inc. ....	1020-1022
Perkin-Elmer Corp. ....	386
Radiation Electronics Co., Div. of Comptometer Corp. ....	1157-1155
Technicon Controls, Inc. ....	316
Welch Mfg. Co., W. M. ....	205

### INSTRUMENTS OF PRECISION

American Instrument Co., Inc. ....	445
American Optical Co., Instrument Div. ....	1081
Analytical Measurements, Inc. ....	314
*Barber-Colman Co., Wheelco In- struments Div. ....	395
Beckman Instruments, Inc., Sci- entific & Process Instruments Div. ....	333
Brabender Corp. ....	37
Brabender Instruments, Inc., C. W. ....	340
Cambridge Instrument Co., Inc. ....	376
Coleman Instruments, Inc. ....	320
*Eclipse Fuel Engineering Co. ....	973
Fenwal Inc. ....	890-892
Fischer & Porter Co. ....	496
*Foxboro Co., The. ....	519
Gow-Mac Instrument Co. ....	1246
Hastings-Raydist, Inc. ....	1020
Industrial Nucleonics Corp. ....	1418-1420
LKB Instruments, Inc. ....	1422
Laboratory Equipment Corp. ....	905
*Minneapolis-Honeywell Regulator Co. ....	635
Perkin-Elmer Corp. ....	386
Photovolt Corp. ....	389
Porter Inc., George K. ....	1134-1136

Potter-Bowser Div., Bowser, Inc. ....	396
Precision Scientific Co. ....	370-372
Precision Thermometer & Instru- ment Co. ....	1401
Scientific Glass Apparatus Co., Inc. ....	332
Sticht Co., Inc., Herman H. ....	1280
Tenso-Lab., Inc. ....	1123
*Thermo Electric Co., Inc. ....	817
Trerice Co., H. O. ....	1287
*Wallace & Tiernan, Inc. ....	686
Welch Mfg. Co., W. M. ....	205
*Yarnall-Waring Co. ....	49

### INSTRUMENTS, TESTING

Airsonic Industrial Stethoscopes, M. Paquet & Co., Inc. ....	1374
American Instrument Co., Inc. ....	445
American Optical Co., Instru- ment Div. ....	1081
Analytical Measurements, Inc. ....	314
Beckman Instruments, Inc., Sci- entific & Process Instruments Div. ....	333
Brabender Corp. ....	37
Brabender Instruments, Inc., C. W. ....	340
Bragar Co., Inc., Norman. ....	1230-1232
Brailsford & Co., Inc. ....	1411
*Brooks Rotameter Co. ....	998
Carver, Inc., Fred S. ....	90
Coleman Instruments, Inc. ....	320
Coulter Industrial Sales Co. ....	1444
*Consolidated Vacuum Corp. ....	1353
*Foxboro Co., The. ....	519
Gow-Mac Instrument Co. ....	1246
Kimble Glass Co. ....	390
Laboratory Equipment Corp. ....	905
New York Laboratory Supply Co., Inc. ....	1022
No Vo Div., Industrial Enter- prises, Inc. ....	1030
Paquet & Co., Inc., M. ....	1374
Perkin-Elmer Corp. ....	386
Photovolt Corp. ....	389
Porter Inc., George K. ....	1134-1136
Precision Scientific Co. ....	370-372
Rockwell Mfg. Co. ....	69
Scientific Glass Apparatus Co., Inc. ....	332
Sticht Co., Inc., Herman H. ....	1280
Technicon Controls, Inc. ....	316
Tenso-Lab., Inc. ....	1123
*Thermo Electric Co., Inc. ....	817
Torsion Balance Co. ....	328
Trerice Co., H. O. ....	1287
Welch Mfg. Co., W. M. ....	205

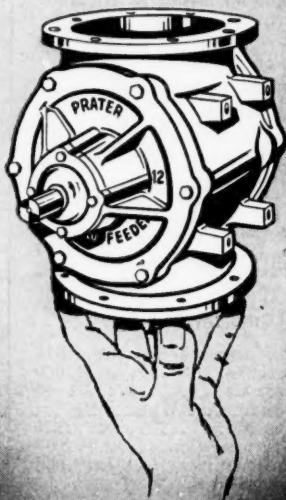
### INSULATING MATERIAL-HEATING, ELECTRIC AND MOLDED

*Allied Chemical Corp. ....	955-957-959-961
*Allis Co., Louis. ....	100
*Aluminum Co. of America. ....	559
Eagle-Picher Co. ....	1167-1169
Ethylene Corp. ....	971
General Plastics Corp. ....	967
Great Lakes Carbon Corp., Dica- lite Dept., Electrode Div. ....	204
Harbison-Walker Refractories Co. .....	1241-1243
*Johns-Manville Sales Corp. ....	172-176
Pennsylvania Fluorocarbon Co., Inc. ....	969
*Pittsburgh Corning Corp. ....	1239
Scientific Glass Apparatus Co., Inc. ....	332
Thermon Mfg. Co. ....	1207

**PRATER** — the recognized  
leader

**ROTARY  
AIRLOCK  
FEEDERS**

for  
**DUST CONTROL  
and  
PNEUMATIC  
CONVEYING**



WRITE FOR BULLETIN P58

**PRATER PULVERIZER COMPANY**

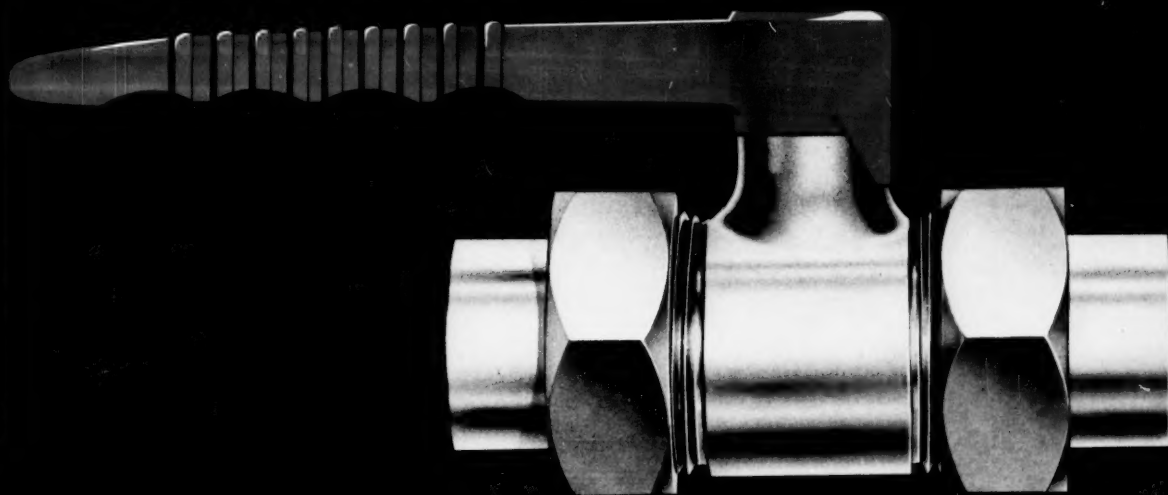
1517 South 55th Court • Chicago 50, Illinois

Code number for  
this advertisement  
**351-354 ➔**



# Announcing!

A  
revolutionary  
**NEW**  
ball valve



Designed by Cooper Alloy for corrosives, slurries, abrasives,  
and exacting process applications. Check these new features



# the Cooper Alloy

Compact, small external size gives the Cooper Alloy Ball Valve the smallest overall altitude of any existing ball valve, with the largest inside part dimensions. Can be installed in tightest spots.

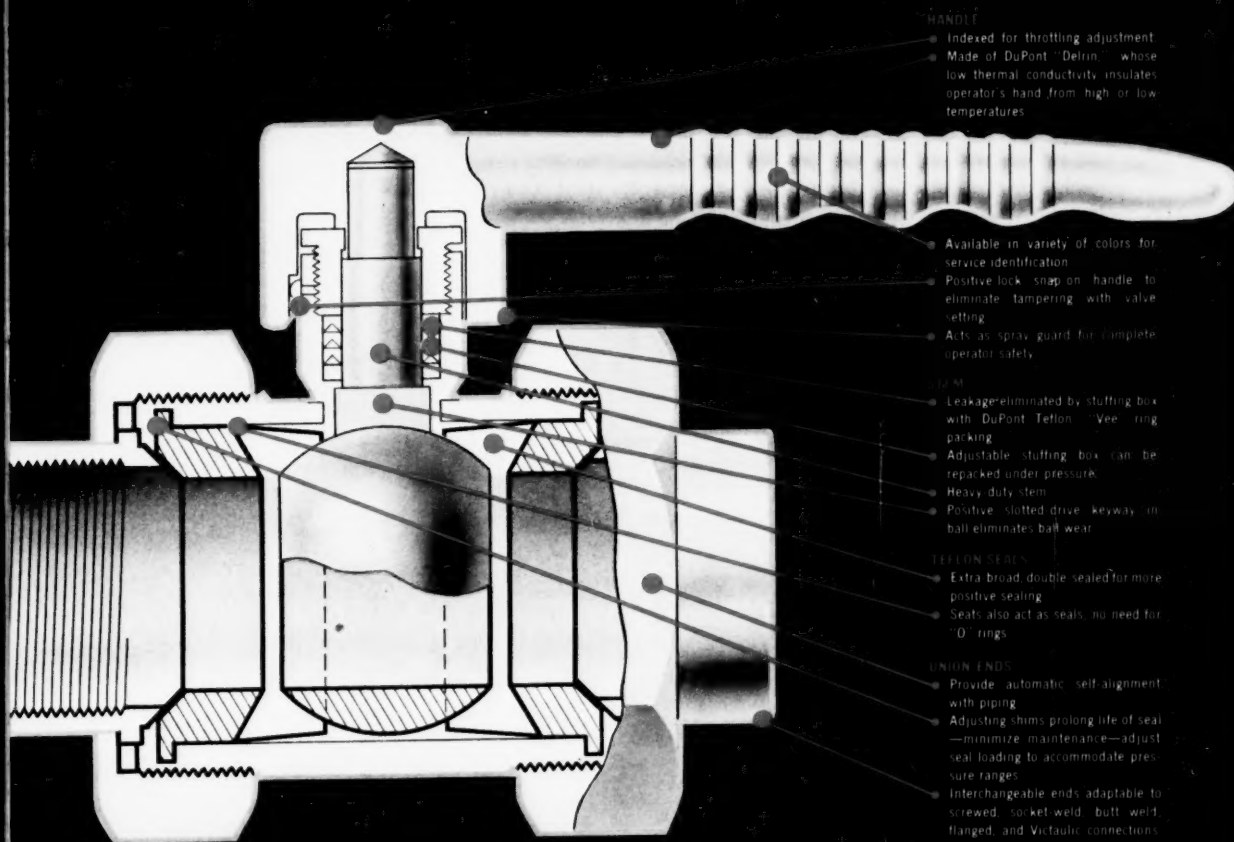


Small number of simple parts means easy installation, long trouble-free operation, minimal maintenance! No complicated mechanisms to go wrong!



**A Triumph of Engineering Design!** The Cooper Alloy Ball Valve operates like a gate valve, handles slurries like a plug valve, and has positive on-off operation like a globe valve. Compare it feature for feature with any other valve on the market today, and you'll see why you get more valve, more valve service for your money, from Cooper Alloy.

# Ball Valve



## HANDLE

- Indexed for throttling adjustment
- Made of DuPont "Delrin," whose low thermal conductivity insulates operator's hand from high or low temperatures

- Available in variety of colors for service identification
- Positive lock snap on handle to eliminate tampering with valve setting
- Acts as spray guard for complete operator safety

## STEM

- Leakage eliminated by stuffing box with DuPont Teflon "Vee" ring packing
- Adjustable stuffing box can be repacked under pressure
- Heavy duty stem
- Positive slotted drive keyway in ball eliminates ball wear

## TEFLON SEALS

- Extra broad double sealed for more positive sealing
- Seats also act as seals, no need for "O" rings

## UNION ENDS

- Provide automatic self alignment with piping
- Adjusting shims prolong life of seal—minimize maintenance—adjust seal loading to accommodate pressure ranges
- Interchangeable ends adaptable to screwed, socket weld, butt weld, flanged, and Victaulic connections
- Quick disassembly of line—minimal down time—easy access to internal parts for service
- Valve can be on flow in any position around axis without special adjustment of flanges

**FULL PORT OPENING**—straight through flow with no restrictions, minimum turbulence and pressure drops—no pockets for entrapment of solids

**PERMITS FLOW** in either direction

**CONTRACT** for installation in tight spots

**HEAVY** to 1000 psi

**FIELD MAINTENANCE** possible with nothing more than standard tools

**ADAPTABLE** for light slurry service, throttling for close regulation of flow, remote control operation where desired

**FACE TO FACE DIMENSIONS** on flanged valve to conform to ASA or MSS specifications

# this valve HAS

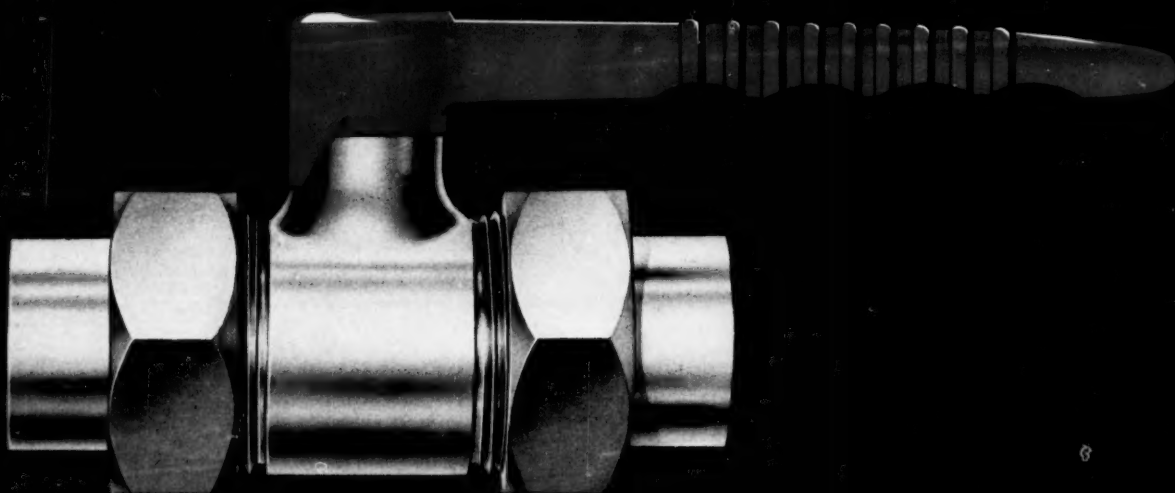
- Union and connections for economy and ease of installation
- Interchangeable end pieces for universal assembly
- Full port openings: no compromise with performance
- Wide Teflon seating for added seat life, positive shut-off, and improved throttability
- Teflon "Vee" ring valve stem packing
- Easy removability from process lines: little down time!
- Stem packing replaceable while in operation: no down time!
- Easy maintenance: minimal down time!

**AVAILABLE IMMEDIATELY** in stainless steel and carbon steel; shortly in brass and plastic.

**SIZES** 1/4" thru 3/4" 1000 psi in stainless steel; 1" thru 2" 600 psi in stainless steel.

**TEMPERATURE RANGE** -300°F. up to +400°F.

**ASK TO SEE IT DEMONSTRATED AND INSTALLED! TRY IT, AND YOU'LL AGREE, THERE'S NEVER BEEN ANOTHER BALL VALVE LIKE IT! FOR INFORMATION, CONTACT US.**

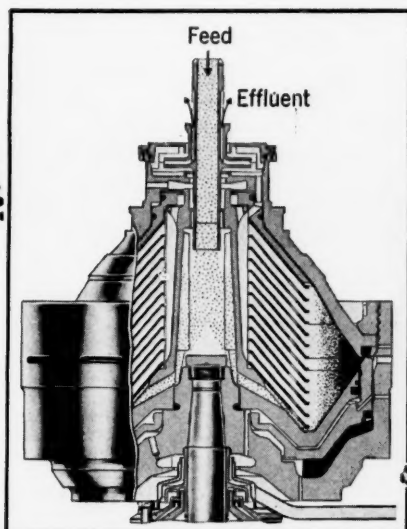


**COOPER  ALLOY**

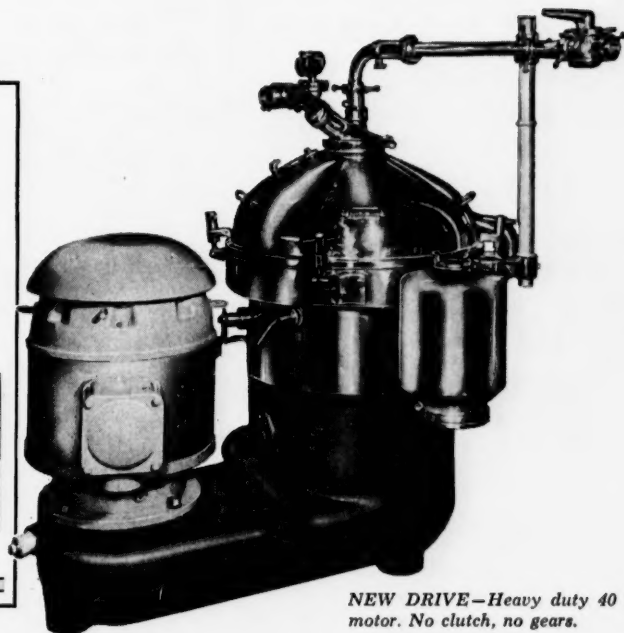
Corporation • Hillside, New Jersey



## NEW! WESTFALIA SAMN-15007 Automatic De-Sludger



**SIMPLE**—Only two more parts than in conventional disc bowl...no nozzles, valves, bolts, or springs to complicate assembly and disassembly.



**NEW DRIVE**—Heavy duty 40 hp motor. No clutch, no gears.

## "BIG SAM" for Continuous High Capacity Clarification

*...with Automatic Sludge Ejection*

### See "Big Sam" at the Chem Show

You can see the "Big Sam" Automatic De-Sludger and other WESTFALIA automatic centrifugals for a wide variety of clarifying and separating operations in Booth No. 842 at the 27th Exposition of Chemical Industries, to be held at the New York Coliseum, Nov. 30-Dec. 4, 1959. Centrico engineers will be happy to answer your questions.

#### ► CONTINUOUS

"Around-the-clock" operation—up to six weeks, depending on product...up to 8000 gph capacity.

#### ► AUTOMATIC

De-sludging cycle controlled by timing unit...choice of complete or partial de-sludging.

#### ► SANITARY

Stainless steel construction throughout bowl and all other liquid and sludge contact parts...bowl designed for complete self-cleaning...CIP cleaning possible.

#### ► PRESSURE DISCHARGE

Built-in pump discharges effluent free of entrained air.

Write for Bulletin on "BIG SAM"

**WESTFALIA  
SEPARATOR**

**CENTRICO**  
INCORPORATED

75 WEST FOREST AVENUE, ENGLEWOOD, N.J. • Phone LOWELL 9-0755



Did  
you say  
10 cents?

NO,  
ONLY  
1/10 OF  
A CENT!

Actually, CVC High Vacuum Stills cut your process costs to under 1/10 of a cent per pound. They are your most economical way to separate esters, vitamin concentrations, plasticizers, waxes, and hundreds of other organic and silicone compounds in 250 to 4000 molecular weight range. You operate at low heat so there's less product waste, higher yield. And they run virtually unattended; fully automated, if you prefer. Four sizes: from two pounds to two tons per hour. Write for High Vacuum Still Bulletin 3-1, and for details on test runs of your samples.



**Consolidated Vacuum**

ROCHESTER 3, NEW YORK

A SUBSIDIARY OF  
CONSOLIDATED ELECTRODYNAMICS CORPORATION  
(FORMERLY ROCHESTER DIVISION)



## SHOW DIRECTORY . . .

Titanium Alloy Mfg. Div., National Lead Co. ....234  
\*Westinghouse Electric Corp. ....510

## INSULATION, FURNACE

Eagle-Picher Co. ....1167-1169  
Harbison-Walker Refractories Co. ....1241-1243  
\*Johns-Manville Sales Corp. ....172-176  
Norton Co. ....1289-1291  
Owens-Corning Fiberglas Corp. ....1266  
\*Pittsburgh Corning Corp. ....1239

## JOINTS, FLEXIBLE

\*Aeroquip Corp. ....1255  
Barco Mfg. Co. ....439  
Carey Mfg. Co., Philip. ....1152  
\*Chiksan Co., Subsidiary of Food Machinery & Chemical Corp. ....1268-1270  
\*Continental-Emsco Co. ....868  
Croll-Reynolds Engineering Co., Inc. ....1054  
Dore' Co., John L. ....1295-1297  
Ethylene Corp. ....971  
\*Fulton Sylphon Div., Robertshaw-Fulton Controls Co. ....1293  
Garlock Packing Co. ....415  
\*Haveg Industries, Inc. ....546  
Nukem Products Corp. ....1072  
RKL Controls, Inc. ....1405  
\*Raybestos-Manhattan, Inc. ....820  
\*Resistoflex Corp. ....893-895-897  
Tube Turns Div., Chemetron Corp. ....98  
\*Tube Turns Plastics, Inc. ....96  
Yuba Consolidated Industries, Inc. ....882-884-886

## KETTLES

Alsop Engineering Corp. ....381  
\*Artisan Metal Products. ....874  
Cleveland Mixer Co. ....1067-1069  
\*Corning Glass Works. ....134  
Dean Panel Coil Div., Dean Products, Inc. ....184  
\*Devine Mfg. Co., J. P. ....1372  
Distillation Engineering Co. ....1048  
Downtown Works, Inc., Div. of Pressed Steel Tank Co. ....631  
Ertel Engineering Corp. ....623  
General Alloys Co. ....193  
\*General American Transportation Corp. ....435-436-442-446-495  
General Ceramics Corp. ....131  
Gifford-Wood Co. ....219  
Glascote Products, Inc. ....596  
Heil Process Equipment Corp. ....1305  
Industrial Products Engineering Co. ....1259  
International Process Equipment Co., Inc. ....812  
Koven Fabricators, Inc. ....74  
Lee Metal Products Co., Inc. ....1384  
Mazzoni, G., S. P. A. ....1412  
Patterson Foundry & Machine Co. ....154  
\*Pfaudler Permutit, Inc. ....110 & 141  
Pressed Steel Tank Co. ....631  
Renneburg & Sons Co., Edw. ....1078  
Scientific Glass Apparatus Co., Inc. ....332  
Stainless Products Corp. ....1158  
Star Tank & Filter Corp. ....233  
Tenso-Lab., Inc. ....1123  
Terriss Div., Consolidated Siphon Supply Co. Inc. ....1329-1331  
Thermon Mfg. Co. ....1207

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Trent, Inc. ....195  
U. S. Mixers Div. of Stockdale Engineering Co. ....1237  
\*U. S. Stoneware Co. ....111

## KILNS


\*Allis-Chalmers Mfg. Co. ....636  
American Gas Furnace Co. ....833  
Bartlett & Snow, C. O. Co. ....569  
\*Carrier Conveyor Corp. ....127  
Chicago Bridge & Iron Co. ....844  
Davenport Machine & Foundry Co. ....818  
\*Fuller Co. ....446  
\*General American Transportation Corp. ....435-436-442-446-495  
\*Kennedy Van Saun Mfg. & Engrg. Corp. ....1036  
North-Erie & American Process Equipment Div. National-U. S. Radiator Corp. ....850  
Renneburg & Sons Co., Edw. ....1078  
\*Selas Corp. of America. ....979-981  
Standard Steel Corp. ....153

## LABORATORIES, TESTING

Blaw-Knox Co. ....581  
Brooks Rotameter Co. ....998  
\*De Laval Separator Co. ....94  
Denver Equipment Co. ....1146  
Electric Hotpack Co., Inc. ....373-375  
Kennedy Van Saun Mfg. & Engrg. Corp. ....1036  
Nichols Engineering & Research Corp. ....624  
No Vo Div., Industrial Enterprises, Inc. ....1030  
Southwestern Engineering Co. ....1250-1252

## LABORATORY APPARATUS AND SUPPLIES

American Instrument Co., Inc. ....445  
American Optical Co., Instrument Div. ....1081  
American Sterilizer Co. ....366  
American Tool & Machine Co. ....862  
Bartlett & Snow Co., C. O. ....569  
Beckman Instruments, Inc., Scientific & Process Instruments Div. ....333  
Bel-Art Products ....889  
Bishop & Co., Platinum Works, J. ....900-902  
Blaw-Knox Co. ....581  
Brinkmann & Co., Inc., C. A. ....360  
Brabender Corp. ....37  
Brabender Instruments, Inc., C. W. ....340  
Carlisle Gas Burner Corp. ....1251  
Carver, Inc., Fred S. ....90  
Chemical and Pharmaceutical Industry Co., Inc. ....1064  
\*Corning Glass Works. ....134  
Coulter Industrial Sales Co. ....1444  
Denver Equipment Co. ....1146  
\*Eaton-Dikeman Co. ....1120  
Engelhard Industries, Inc. ....192-196  
Ertel Engineering Corp. ....623  
\*Fansteel Metallurgical Corp. ....617  
General Laboratory Supply Co. ....310  
Gifford-Wood Co. ....219  
Great Western Mfg. Co. ....216  
\*Hardinge Co., Inc. ....582  
\*Hercules Filter Corp. ....213  
Industrial Plastic Fabricators, Inc. ....1102  
Industrial Products Engineering Co. ....1259  
Kimble Glass Co. ....390  
LKB Instruments, Inc. ....1422  
Laboratory Equipment Corp. ....905  
Laboratory Glass & Instruments Corp. ....369  
Lead Lined Iron Pipe Co. ....70



# Fluoroflex-TS piping has proven performance with all acids

**FLUOROFLEX-T LINER**  
Teflon® at its best—  
applied by the unique  
Resistoflex process  
at our enlarged plant  
shown above

**FLUOROFLEX-TS PIPE** is chemically inert, corrosion-proof and proven by more than two years of service in the most rugged applications. It is fabricated by a special Resistoflex process so that liner and housing are in thermal equilibrium for maintenance-free, long-life service. Liner is formed over full gasket face of the flange for continuous corrosion protection over a wide temperature range from  $-100^{\circ}\text{F}$  to  $+500^{\circ}\text{F}$ .

**INCREASED MANUFACTURING FACILITIES** now in operation reflect the growing demand for Fluoroflex-TS piping. Corrosion engineers and process designers can depend on Fluoroflex-TS piping backed with full production operations by the company that originated Teflon hose and pioneered the development of Teflon lined pipe.

**FOR MORE INFORMATION** . . . Write for Bulletin TS-1A to Dept. 413, RESISTOFLEX CORPORATION, Roseland, N. J. Other Plants: Anaheim, Calif.; Dallas, Tex.

## RESISTOFLEX

*Complete systems for corrosive service*

\*Fluoroflex is a Resistoflex trademark, reg., U.S. pat. off.

\*Teflon is DuPont's trademark for TFE fluorocarbon resin.

## SHOW DIRECTORY . . .

Lehmann Co., Inc., J. M.	1429-1431-1446
Leitz, Inc., E.	1383
*Manton-Gaulin Mfg. Co., Inc.	51
*Metals & Controls Div., Texas Instruments, Inc.	1094
Micro Metallic Div., Pall Corp.	1012-1014
Namco Machinery, Inc.	365
Nalge Co., Inc.	1201
New Brunswick Scientific Co., Inc.	324
New York Laboratory Supply Co., Inc.	1022
*Norton Co.	1289-1291
No Vo Div., Industrial Enterprises, Inc.	1030
Palo Laboratories Supplies, Inc.	385
Pennsylvania Fluorocarbon Co., Inc.	969
Perkin-Elmer Corp.	386
Photovolt Corp.	389
Podbielniak, Inc.	595
Precision Scientific Co.	370-372
*Premier Mill Corp.	1391
*Protectoseal Co.	1286
*Pulverizing Machinery Div., Metals Disintegrating Co., Inc.	632
Research Controls	1186
*Sargent's Sons Corp., C. O.	1375-1377
Sargent and Co., E. H.	1394

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Schutz-O'Neill Co.	1028
Scientific Glass Apparatus Co., Inc.	332
Seavy & Sons, M. J.	1071
Smith Co., T. L.	986
Sorvall, Inc., Ivan	342
Southwestern Engineering Co.	1250-1252
Sperry & Co., D. R.	1362
*Sturtevant Mill Co.	421
*Superior Electric Co.	804
Technicon Controls, Inc.	316
Tenso-Lab., Inc.	1123
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Tri-Homo Corp.	214
Tri-Rotor, Inc.	1439
Union Process Co.	1311-1313
Welch Mfg. Co., W. M.	205
Wilmot Castle Co.	1033

## LABORATORY FURNITURE

Alberene Stone, Div. of Georgia Marble Co.	465
Blickman, Inc., S.	325
Browne-Morse Co.	1359
*Duralab Equipment Corp.	359
*Duriron Co., Inc.	520 & 532
Johns-Manville Sales Corp.	172-176
Kewaunee Manufacturing Co.	398
Laboratory Furniture Co.	309
Metalab Equipment Corp., Div. of Norbute Corp.	356
Nalge Co., Inc.	1201
New York Laboratory Supply Co., Inc.	1022

Scientific Glass Apparatus Co., Inc.	332
Sheldon Equipment Co., E. H.	336
Welch Mfg. Co., W. M.	205

## LACQUERS

*Allied Chemical Corp.	955-957-959-961
*Enjay Co., Inc.	944-946-948

## LAMPS

Engelhard Industries, Inc.	192-196
*Westinghouse Electric Corp.	510

## LEAD BURNING AND COATING

Heil Process Equipment Corp.	1305
Knapp Mills, Inc.	175
Lead Industries Assn.	816
Lead Lined Iron Pipe Co.	70
*U. S. Stoneware Co.	111

## LIME, CHEMICAL AND HYDRATED

*Allied Chemical Corp.	955-957-959-961
------------------------	-----------------

## LOADERS

*Eimco Corp.	80
*Fuller Co.	446
Vac-U-Max	1195-1197

## LUBRICATING SYSTEMS

*Farval Corp.	158
---------------	-----

## MAGNETIC SEPARATORS

Crucible Steel Co. of America	1424-1426-1428
*Eriez Mfg. Co.	909-911
*Jeffrey Mfg. Co.	97
Prater Pulverizer Co.	904-906

## MASTICATORS

Baker Perkins, Inc.	560 & 609
*Day Co., J. N., Div. of Cleveland Automatic Machine Co.	121-122
Rietz Mfg. Co.	1231
Ross & Son Co. Inc., Charles	983-985
Supreme Div., Franklin P. Miller & Son, Inc.	1010

## MATERIALS HANDLING EQUIPMENT

*Allis-Chalmers Mfg. Co.	636
Bartlett & Snow Co., C. O.	569
Bucket Elevator Co.	1038
*Carrier Conveyor Corp.	127
Chain Belt Co.	1416
*Daffin Mfg. Co.	1400-1404
*Day Co.	45
Day Co., J. H., Div. of Cleveland Automatic Machine Co.	121-122
*Dean Brothers Pumps, Inc.	1245-1247-1249
*Dracoo Div., of Fuller Co.	495
*Eimco Corp.	80
Eriez Mfg. Co.	909-911
*Fuller Co.	446
*General American Transportation Corp.	435-436-442-446-495
Gifford Wood Co.	219
Glengarry Processes, Inc.	60
Hapman Conveyors, Inc.	1358
*Jeffrey Mfg. Co.	97
Kennedy Van Saun Mfg. & Engrg. Corp.	1036
Link-Belt Co.	165
M-H Standard Corp.	997
Miller Products Co., Inc.	1091
Nukem Products Corp.	1072

## 5' DIAMETER x 18' LONG DAVENPORT ROTARY STEAMTUBE DRYER



**DAVENPORT**  
PRESSING - DRYING  
and  
COOLING Equipment  
Continuous DeWatering  
Presses  
ROTARY DRYERS  
Steam Tube Hot Air  
and Direct Fire  
Atmospheric  
DRUM DRYERS  
ROTARY COOLERS  
Water and Air

## TAILORMADE TO SPECIFICATIONS

For drying usable waste solids which were previously put into the city sewer. High B.O.D. count of sewage made this installation economical and practical.

If you have a similar disposal problem, consult our Engineering Staff. See 196Q Chemical Engineering catalog or write for our catalog "A"

**DAVENPORT MACHINE AND  
Foundry Company**  
Davenport, Iowa, U.S.A.





MOYNO<sup>®</sup>  
CHEMICAL PUMPS

## MOYNO<sup>®</sup> PUMPS capacities: from 1/100 to 500 gpm pressures: up to 1000 psi

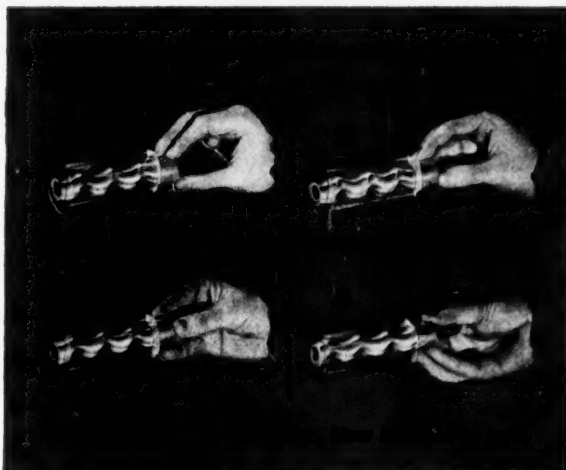


MOYNO pumps are available in nine sizes with capacities ranging from minimum metering flow to 500 gpm and pressures from zero to 1000 psi. Positive displacement delivers

uniform discharge without pulsation, agitation or turbulence. Solutions ranging from thin watery slurry to extremely viscous paste, corrosives, abrasives and even solids in suspension are economically handled without excessive pump wear.

MOYNO's unique "progressing cavity" principle with only one moving part and special resistant internal parts slashes pump maintenance costs on problem chemicals that often ruin other pumps. Almost any substance that can be forced through a pipe can be pumped by a MOYNO.

To learn how a MOYNO can cut your pumping costs, see our product information in *Chemical Engineering Catalog*, or write today for Bulletin 30 CE.



### ROBBINS & MYERS, INC.

motors, household fans, Propellair industrial fans, hoists, Moyno industrial pumps  
SPRINGFIELD, OHIO • BRANTFORD, ONTARIO



Close Hook-Up Gages.  
No. 25-R-20 gage, side connected with No. 66 valves (offset inside) shown.



Internal Tube Model Heated-Cooled Gage, Reflex Type



Patented Non-Frosting Gage



EPL-56 Illuminator, UL and CSA Approved, for use on all Jerguson Gages



Magnetic Gage. Safety sealed.



Welding Pad Gages, staggered for continuous visibility



No. 66UVC Instrument Piping Valve, with vertical rising ball check



No. 93 Valve (Jacketed for Heating or Cooling)

## At Jerguson you get a complete line of LIQUID LEVEL GAGES, VALVES and SPECIALTIES For Chemical and Petrochemical Processing

Jerguson works closely with the men in the chemical and petrochemical industries and has developed a complete line of specialized gages, valves and other equipment to meet your problems of observation of liquids and levels. All types of gages and valves are available in stainless, monel, nickel, hastelloy and many other materials . . . also with rubber, neoprene, lead, teflon, Kel-F and other linings. Gages are made in a variety of connections . . . end, side or back . . . for close hook-ups to meet your needs.

**New Magnetic Gage.** For use under conditions where glass, gaskets and threads cannot be used.

**Close Hook-Up Gages.** Made in Reflex or Transparent types with a variety of offset valves for several close hook-up installations.

**Large Chamber Gages.** Minimize boiling and surging effect. Made in both Reflex and Transparent; also with non-frosting gage glass extension.

**Welding Pad Gages.** For use where gage must be integral part of vessel. Also made in circular sight glass model.

**Group "G" Instrument Piping Valves.** Give tremendous time and cost savings. Unions, nipples, reducers, elbows, tees, valve and bleed valve all combined in space saving unit, greatly reducing number of connections.

**Heated and Cooled Gages and Valves.** Complete line of heated and cooled gages and valves, in various models, both Reflex and Transparent.

**Non-Frosting Gages.** (Patented Flat Glass model, Reflex type, illustrated.) Effective frost preventing gages in both internal and external tube models.

Write for Data on Jerguson Products for  
Chemical and Petrochemical Processing.

# JERGUSON

Gages and Valves  
for the Observation  
of Liquids and Levels

Representatives in Major Cities  
Phone Listed Under JERGUSON

See the Latest Developments at  
Booths 1211-13, The Chemical Show

## JERGUSON GAGE & VALVE COMPANY

100 Adams Street • Burlington, Mass.

Jerguson Tress Gage & Valve Co., Ltd., London, Eng., Pétrole Service, Paris, France

## SHOW DIRECTORY . . .

Prater Pulverizer Co.	904-906
Pulva Corp.	220
*Pulverizing Machinery Div., Metals Disintegrating Co., Inc.	632
RKL Controls, Inc.	1405
*Read Standard Div., Capitol Products Corp.	162
Renneburg & Sons Co., Edw.	1078
Richardson Scale Co.	1151-1153
Smith Co., T. L.	986
Southwestern Engineering Co.	1250-1252
Specialty Machinery Corp.	1413-1430
Sprout, Waldron & Co., Inc.	846-848
Sterling Fleischman Co.	1077
*Strong-Scott Mfg. Co.	1274-1276-1278
Syntron Co.	163
Tote System, Inc.	858-860
Tri-Rotor, Inc.	1439
*U. S. Stoneware Co.	111
Vac-U-Max	1195-1197
*Wallace & Tiernan, Inc.	686
*Westinghouse Electric Corp.	510
Yeomans Brothers Co.	1156
Young Machinery Co. Inc., The	1087

## METAL COATING AND PLATING

Cobalt Information Center, c/o Battelle Memorial Institute	1415
*Consolidated Vacuum Corp.	1353
*General American Transportation Corp.	435-436-442-446-495
*Haynes Stellite Co., Div., Union Carbide Corp.	460-470
Heil Process Equipment Corp.	1305
International Nickel Co., Inc.	509
Knapp Mills Inc.	175
Metall Cladding, Inc.	1378
Moore & Co., Samuels, Dekorons Products Div.	1182-1184

## METAL CONTAINERS

Alloy Products Corp.	1205
Aluminum Co. of America	559
Delaware Barrel & Drum Co., Inc.	1187-1189-1193
*Fansteel Metallurgical Corp.	617
*General American Transportation Corp.	435-436-442-446-495
Glenarry Processes, Inc.	60
Greif Bros. Cooperage Corp.	41
Knapp Mills, Inc.	175
Lead Industries Assn.	816
Pressed Steel Tank Co.	631
*Protectoseal Co.	1286
Rheem Mfg. Co.	808-810
Republic Steel Corp.	68
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331

## METALS

*Aluminum Company of America	559
Ampeco Metal, Inc.	412
*Armco Steel Corp.	1221-1223
Bishop & Co., Platinum Works, J.	900-902
Cobalt Information Center, c/o Battelle Memorial Institute	1415
*Cooper Alloy Corp., Div.	103
Crucible Steel Co. of America	1424-1426-1428
Curtiss-Wright Corp., Metals Processing Div.	1344-1346
*Fansteel Metallurgical Corp.	617
Harper Co., H. M.	1032-1034

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



## THE SPECIALISTS TO CALL FOR DUST CONTROL "KNOW-HOW"



1. A. L. NICHOLS  
KEMP INDUS. SUPPLIES  
VANCOUVER 10  
EM 9297

2. A. C. WRIGHT  
PREF. EQUIP. ENGINEERS  
SEATTLE 1  
MA 2-3964

3. W. L. PENICK  
WEST. PRECIP. CORP.  
SAN FRANCISCO 4  
EX 2-0354

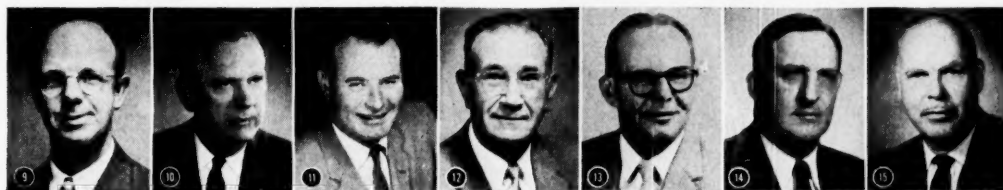
4. R. J. PLASS  
WEST. PRECIP. CORP.  
LOS ANGELES 54  
MA 7-4771

5. RAY NELSON  
C. H. SPENCER & CO.  
SALT LAKE  
IN 6-8683

6. JOHN PEARSON  
G. M. WALLACE & CO.  
DENVER 2  
AM 6-0386

7. EARLE DRAXTON  
R. C. READ & CO.  
HOPKINS, MINN.  
WE 8-2711

8. F. A. SUMMERVILLE  
W. H. BIXBY, INC.  
DES MOINES 9  
AT 8-0661



9. H. McPHERSON  
1004 BALTIMORE AVE.  
KANSAS CITY 5  
HA 1-0744

10. FRANK NEIL  
PETRO-CHEM EQUIP. CO.  
HOUSTON 19  
JA 9-3596

11. E. F. SCHERR  
WEST. PRECIP. CORP.  
CHICAGO 2  
AN 3-4433

12. L. R. LEATHERMAN  
LEATHERMAN & CO.  
DETROIT 32  
WO 1-2535

13. J. A. GERLACH  
1216 RIDGE CLIFF RD.  
CINCINNATI 15, O.  
VA 1-5644

14. D. W. McCONNELL  
McCONNELL SALES CORP.  
BIRMINGHAM 9  
TR 1-3501

15. K. H. CREE  
WEST. PRECIP. CORP.  
ATLANTA 5  
CE 3-6255



16. GIL REHM  
WEST. PRECIP. CORP.  
PITTSBURGH 22  
GR 1-2116

17. R. W. SMITH  
PRECIP. CO. OF CANADA  
MONTREAL 9  
RE 9-2711

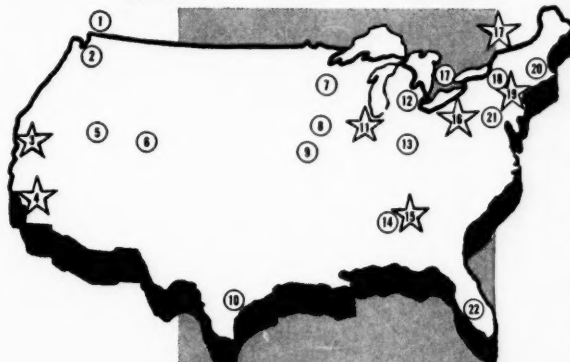
18. J. L. HALEY, JR.  
JOHN HALEY, INC.  
SYRACUSE 3  
GR 4-3984

19. WM. A. HENKE  
WEST. PRECIP. CORP.  
NEW YORK 17  
OX 7-8360

20. N. W. CARGILL  
185 DEVONSHIRE ST.  
BOSTON 10  
HA 6-0303

21. H. W. HENDRIX  
237 LANCASTER AVE.  
DEVON, PENN.  
MU 8-2521

22. LEE HORTON  
PAT FLANAGAN, INC.  
TAMPA 1  
64-6131



### FREE!

Write for  
Bulletin  
#F103  
which  
describes  
Dualaire  
advantages!



COTTRELL Electrical Precipitators  
MULTICLONE Mechanical Collectors  
CMP Combination Units  
DUALAIRE Jet-Cleaned Filters  
THERM-O-FLEX Hi-Temp Filters  
TURBULAIRE-DOYLE Scrubbers  
HOLD-FLITE Processors  
HI-TURBIAHT Heaters

## Versatile DUALAIRE Jet-Cleaned Filter Systems

have many advantages for collecting dust from industrial processes. The Dualaire filter tube is cleaned continuously in small increments—not with sudden surges as in jarring or rapping. Pressure drop remains uniformly low... filter efficiencies run as high as 99.99%. No stand-by units are needed—no costly down time for cleaning.

The men shown here are typical of the Dualaire experience available to you—coast to coast—for solving industrial dust problems. Although you may think your particular gas cleaning requirements are unusual, these men have probably solved the same or similar problem for others right in your area.

One of these field specialists is as close as your telephone. Why not call him today?

SEE OUR BOOTH #1181 AT THE CHEM SHOW

WESTERN

## PRECIPITATION

CORPORATION

B-124

Engineers and Constructors of Equipment for Collection of Suspended Material from Gases... and Equipment for the Process Industries  
LOS ANGELES 54 • NEW YORK 17 • CHICAGO 2 • PITTSBURGH 22 • ATLANTA 5 • SAN FRANCISCO 4  
Representatives in all principal cities

Precipitation Company of Canada Ltd., 8285 Mountain Sights Avenue, Montreal 9

# NO DANGER FROM ACID AND SOLVENT SPRAYS



## CHEMPRO EXTERNAL MECHANICAL SEAL

- Installed in 20-30 minutes.
- Stuffing box pressures to 35 psi.
- No mounting gland.
- Flushing, cooling and/or lubricating can be supplied on all seals.

CHEMPRO is the only EXTERNAL mechanical seal with seal faces located *inside* the pump stuffing box. This eliminates hazardous spray conditions existing with ordinary seals whose faces are outside the stuffing box.

Unlike internal seals, the CHEMPRO is *never completely immersed in the pumping liquid*. Seal faces are adjustable EXTERNALLY by single set screw arrangement—without dismantling the seal or pulling pump shaft.

Write for Chempro Seal Bulletin CP551.



**CHEMICAL & POWER PRODUCTS, INC.**  
The Original Fabricators of Teflon Packings and Gaskets

5 Broadway, New York 4, N. Y.

## SHOW DIRECTORY . . .

*Haynes Stellite Co., Div., Union Carbide Corp. ....	460-470
International Nickel Co., Inc. ....	509
Lead Industries Assn. ....	816
Lebanon Steel Foundry. ....	20
Mallory-Sharon Metals Corp. ....	1133-1135
Metall Hydrides Inc. ....	964
Metals & Controls Div., Texas Instruments, Inc. ....	1094
Metalsalts Corp. ....	933
National-U. S. Radiator Corp. ....	850
National Tube Div., United States Steel Corp. ....	590
Plastic Metals Div., National-U. S. Radiator Corp. ....	850
*Republic Steel Corp. ....	68
Titanium Alloy Mfg. Div., National Lead Co. ....	234
Union Steel Corp. ....	840

## METERS

B-I-F Industries, Inc. ....	660
*Bailey Meter Co. ....	46
Beckman Instruments, Inc., Scientific & Process Instruments Div. ....	333
Bowser, Inc. ....	1115
*Brooks Rotameter Co. ....	998
Buffalo Meter Co., Inc. ....	947
*Eclipse Fuel Engineering Co. ....	973
*General Electric Co. ....	482
*Hoke Inc. ....	201
Industrial Nucleonics Corp. ....	1418-1420
Porter Inc., George K. ....	1134-1136
Potter-Bowser Div., Bowser, Inc. ....	396
*Robertshaw-Fulton Controls Co., Aeronautical & Instrument Div. ....	1366-1368
*Rockwell Mfg. Co. ....	69
Schutte and Koerting Co. ....	61
*Selas Corp. of America. ....	979-981
Sticht Co., Inc., Herman H. ....	1280
Tenso-Lab, Inc. ....	1123
*Thermo Electric Co., Inc. ....	817
Welch Mfg. Co., W. M. ....	205
*Westinghouse Electric Corp. ....	510

## MICROSCOPES

American Optical Co., Instrument Div. ....	1081
General Laboratory Supply Co. ....	310
New York Laboratory Supply Co., Inc. ....	1022
Scientific Glass Apparatus Co., Inc. ....	332
Tenso-Lab, Inc. ....	1123
Welch Mfg. Co., W. M. ....	205

## MILLS

Abbé, Inc., Paul O. ....	984
*Allis-Chalmers Mfg. Co. ....	636
California Pellet Mill Co. ....	1360
Chemical and Pharmaceutical Industry Co., Inc. ....	1064
*Chemicolloid Laboratories, Inc. ....	618
Cog Corp., The, Div. of Motograph, Inc. ....	1388
*Combustion Engineering, Inc., Raymond Div. ....	646
Denver Equipment Co. ....	1146
*Devine Mfg. Co., J. P. ....	1372
Eimco Corp. ....	80
Entoleter Div., Safety Industries, Inc. ....	1599
Fluid Energy Processing & Equipment Co. ....	813
*Fuller Co. ....	446
Galigher Co. ....	843
*General American Transportation Corp. ....	435-436-442-446-495

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.





# FLAMMABLES ENGINEERING BY PROTECTOSEAL

FLAMMABLES CONTROL METHODS AND PRACTICES IN PRODUCTION, PROCESSING AND IN MAINTENANCE

PUBLISHED BY THE PROTECTOSEAL COMPANY, CHICAGO, ILLINOIS

WAREHOUSES: CAMDEN, N. J.; LOS ANGELES, CALIF.

## Fire-explosion controls for the industrial laboratory

### Space-saving shelf storage

Convenient, oval shape containers now safely store more liquids in limited shelf area.

### Fire-safe accurate dispensing

Full pouring control avoids hazard of spillage. No lifting of heavy, awkward unsafe cans.

### Fast, controlled waste disposal

Provides fire-safe disposal and removal of waste liquids from laboratory work stations.



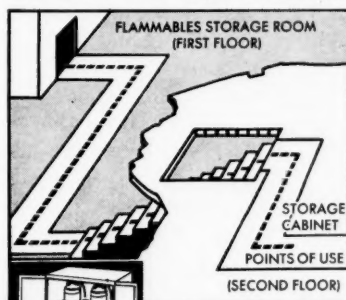
Specially designed safety containers eliminate constant hazard of awkward, hard-to-handle, leaky, make-shift cans and bottles. Oval shape safety containers require far less shelf space than ordinary unpro-

tested round cans . . . easily labeled for quick identification. Safety dispensing container on tilt-frame has special fire-protective top faucet . . . provides visual, controlled transfer of liquids to smaller laboratory con-

tainers . . . simply tilt and pour. Wide-mouth chemicals disposal can safely provides for elimination of waste chemicals . . . does away with hazardous practice of pouring chemicals into sink drain.

For Further Information Request Laboratory Safety Equipment File No. 67

## Are these extra trips necessary?



No! . . . time-saving flammable liquids storage cabinet may be located close to work station . . . within the plant or laboratory . . . permits convenient storage of up to 45 gallons of flammable liquids at-the-job . . . stops wasteful, time-consuming trips to remote storage vaults. Built to N.F.P.A. specifications.

For Further Information  
Request Flammables Storage Cabinet File No. 55

## Reduce corrosion losses in flammables handling equipment

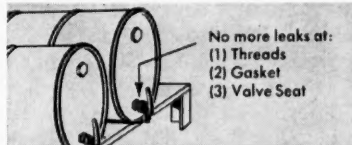
Certain liquids used in chemical industries found to corrode standardterne plate storage-dispensing containers . . . cause contamination of contents . . . weakening of body seams. Tests show special metals,

such as stainless steel, often best suited for these liquids . . . other types may require monel metal or hot tin dipped coatings. Protectoseal engineers design and build custom special-purpose equipment to meet individual requirements.

For Further Information  
Request Special Metal Containers File No. 74

## Saves costly drum faucet repairs—replacements

Stainless steel construction eliminates corrosive action and contamination of liquids. No leakage! . . . self-positioning spout on swivel avoids



stripped threads . . . Teflon O-Ring Gasket universally impervious to all liquids . . . no wrench-pressure damage to valve seat located at inlet end of faucet. Result—flammables . . . and corrosives . . . dispensed safely . . . fewer faucet repairs . . . far longer faucet life.

For Further Information  
Request Drum Dispensing File No. 68

## Plant waste disposal hazards can be avoided

Good housekeeping begins at the job . . . with safety waste disposal cans lo-

cated at each work station . . . prevents hazardous pyramiding of wastes within the plant . . . avoids possibility of overloading wastes in one area with the hazard of spontaneous combustion fires . . . keeps plant and lab premises safe, orderly.

For Further Information  
Request Safety Waste Containers File No. 57

## How to avoid excessive corrosion losses on tank safety vents

Secure individual types of corrosion-resistant metals for valves, flame arresters, housings. Precision engineered vent designs are available in wide choice of special metals . . . insure longer working life . . . fewer inspections . . . less parts replacement. Combinations of metals to meet individual problems of corrosive vapors and atmospheric conditions include the following:

Aluminum	Stainless Steel	Brass
Cast Iron	Bronze	Monel
		Hastelloy

### AT YOUR SERVICE . . .

These experienced specialized Protectoseal Flammables Engineers. See you at the Chem. Show.



Jerry McCarthy



Roy Gaffke

### THE PROTECTOSEAL COMPANY

1948 So. Western Ave., Chicago 8, Illinois  
In Canada: Safety Supply Co., Toronto

**BS&B Safety Heads**

The "CIRCUIT BREAKER" of Pressured Systems

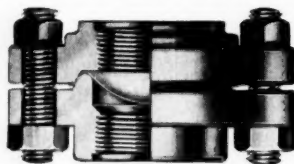
*Tranquilizer* ... made of metal

**You don't swallow this "tranquilizer"...** but it can bring you priceless peace of mind! It's the rupture disc in a BS&B Safety Head—one of thousands upon thousands that protect personnel and equipment against dangerous pressure build-ups in vessels and lines containing air, gases or liquids.

**When pressures rise** above predetermined safe limits, this disc ruptures to provide instantaneous, unrestricted relief. BS&B designs discs to rupture at any specified pressure from 3 to 100,000 pounds per square inch. They are supplied in sizes ranging from 3/4-inch to 36 inches diameter, and in special sizes to virtually any specification.

**BS&B SAFETY HEADS** protect pressure systems in every type of industry

Thousands of BS&B Safety Heads have been in use for the past 26 years in virtually every type of industry where pressure protection is a problem. If your responsibility includes the safe operation of pressured systems in your plant, why not let us tell you more about BS&B Safety Heads?



**BLACK,  
SIVALLS &  
BRYSON, INC.**

manufacturers of diaphragm valves, controllers, regulators, safety heads.  
Dept. 2-N11  
7500 East 12th St.  
Kansas City 26, Mo.

**SHOW DIRECTORY . . .**

Gifford Wood Co.	219
Gump Co., B. F.	1024-1026
*Hardinge Company Inc.	582
Howes Co., Inc., S.	1029
International Process Equipment Co., Inc.	812
*Kennedy Van Saun Mfg. & Engrg. Corp.	1036
Lehmann Co., Inc., J. M.	1429-1431-1446
Mazzoni, G., S. P. A.	1412
*Morehouse-Cowles, Inc.	814
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp.	850
Patterson Foundry & Machine Co.	154
Porcelain Div., Ferro Corp.	154
*Premier Mill Corp.	1391
Pulva Corp.	220
*Pulverizing Machinery Div., Metals Disintegrating Co., Inc.	632
Ross & Son Co., Inc., Charles	983-985
Schutz-O'Neill Co.	1028
Scientific Glass Apparatus Co., Inc.	332
Sonic Engineering Corp.	1122
Southwestern Engineering Co.	1250-1252
*Sprout, Waldron & Co., Inc.	846-848
*Sturtevant Mill Co.	421
Tri-Homo Corp.	214
Union Process Co.	1311-1313
*U. S. Stoneware Co.	111

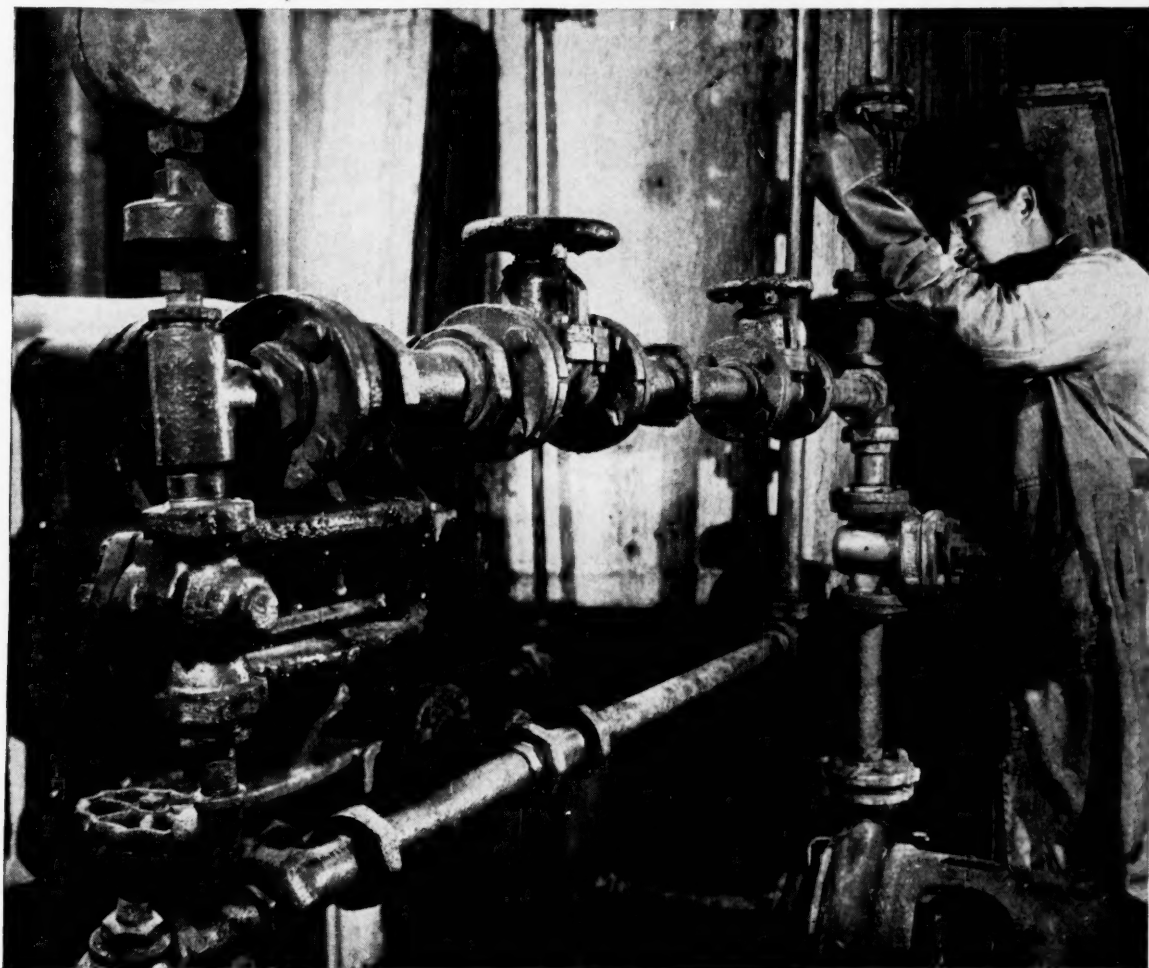
**MINERALS**

Allied Chemical Corp.	955-957-959-961
Minerals & Chemicals Corp. of America	950
Titanium Alloy Mfg. Div., National Lead Co.	234
U. S. Borax & Chemical Corp.	918-920

**MIXING AND KNEADING MACHINERY**

Abbé, Inc., Paul O.	984
Alsop Engineering Corp.	381
American Tool & Machine Co.	862
*Baker Perkins, Inc.	560 & 609
Bartlett & Snow Co., C. O.	569
Brabender Instruments, C. W.	340
Bramley Machinery Corp.	187
Chemical and Pharmaceutical Industry Co., Inc.	1064
*Chemineer, Inc.	1220
Cherry-Burrell Corp.	1039-1045-1049
Cleveland Mixer Co.	1067-1069
Colton Co., Arthur Div., Snyder Corp.	50
*Daffin Mfg. Co.	1400-1404
*Day Co., J. H., Div. of Cleveland Automatic Machine Co.	121-122
Devine Mfg. Co., J. P.	1372
Entoleter Div., Safety Industries, Inc.	1599
Gabb Special Products, Inc.	1106
*General American Transportation Corp.	435-436-442-446-495
Gifford Wood Co.	219
Gump Co., B. F.	1024-1026
Hetherington & Berner, Inc.	1100
Hockmeyer & Co., Herman	1178
Howes Co., Inc., S.	1029
International Process Equipment Co., Inc.	812
Lee Metal Products Co., Inc.	1384
Lehmann Co., Inc., J. M.	1429-1431-1446

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

**DOW****SARAN LINED PIPE**

**After eight years carrying lithium chloride brine . . .**  
**no corrosion in SARAN Lined Pipe**

When pipe must carry extremely corrosive lithium chloride brine . . . when floor-level installation freely exposes it to danger of accidental damage from trucks and tools . . . doubly protective SARAN Lined Pipe can mean dependable, low-maintenance operation for many years.

Lithium Corporation of America's Minneapolis, Minnesota, plant produces pure lithium metal as well as various lithium salts. In the production of lithium chloride, SARAN Lined Pipe is used to carry LiCl brine to drying equipment for the removal of water. This brine is extremely corrosive and will quickly eat through steel pipe should a crack develop in the lining. Other SARAN Lined Pipe carries suspensions of lithium fluoride and hydrofluoric acid, a combination which will attack and destroy even glass. Because of its strength and extreme corrosion resistance, there's

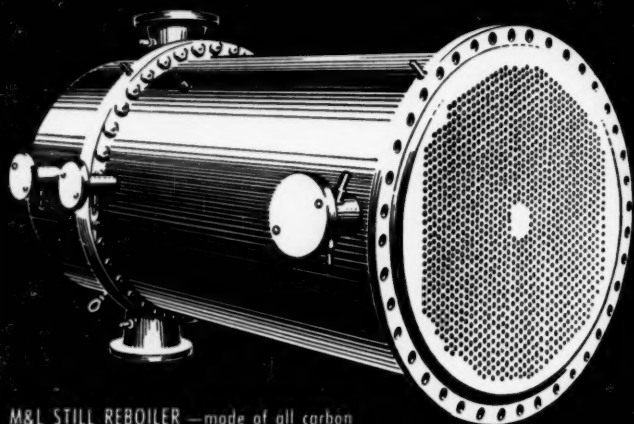
never been a failure in the SARAN Lined Pipe.

SARAN Lined Pipe at this plant is installed close to floor level in some working areas, constantly exposed to the danger of accidental damage from trucks and tools. Lithium's engineers stated, "SARAN Lined Pipe provides protection from outside damage and from corrosion by the solutions carried. In eight years of pumping LiCl brine through SARAN Lined Pipe at 30 to 50 psi, there's never been a breakdown, and very little maintenance was required."

SARAN Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, from below zero to 200° F. They can be cut, fitted and modified easily in the field, without special equipment. For more information, write Saran Lined Pipe Company, 2415 Burdette Avenue, Ferndale, Michigan, Dept. 2281AK11-16.

**THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN**

# MANNING & LEWIS



**M&L STILL REBOILER**—made of all carbon steel to A.S.M.E. code and T.E.M.A. specifications. (Design temp. 450°F, weight 9500 lbs., Shell—44" dia., 8'9" length, 1-1/16" thick, 1500 steel tubes—3/4" O.D. x 14 B.W.G.)

Many years of experience have given us an unusually thorough knowledge of the appropriateness, adaptability and qualities of fabrication of a wide variety of metals. This accumulated knowledge, coupled with our engineering experience and the important "extras" in fabrication, is your assurance of practical trouble-free equipment at the lowest possible cost.

It is impossible, in a field requiring such wide diversification, to illustrate, or even list all the products we have been called upon to supply. An excellent case in point, however, is the Reboiler above. In its fabrication, X-Raying was performed to assure perfect welds. This example is typical of the "extra" care you can expect and get from Manning & Lewis.

*Call on us the next time you need equipment. We are fully qualified to design and fabricate to all codes.*



## MANNING & LEWIS

**ENGINEERING COMPANY**

Dept. A, 28-42 Ogden Street, Newark, New Jersey

**DESIGNERS & MANUFACTURERS OF QUALITY HEAT EXCHANGE EQUIPMENT**

### SHOW DIRECTORY . . .

Mazzoni, G., S. P. A.	1412
Mixing Equipment Co., Inc.	146
*Morehouse-Cowles, Inc.	814
*Netco Corp.	79
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp.	850
*Patterson Foundry & Machine Co.	154
*Philadelphia Gear Corp.	123
Posey Iron Works, Inc.	1407
Premier Mill Corp.	1391
Rapids Machinery Co., Inc.	1162
Read Standard Div. Capitol Products Corp.	162
Renneburg & Sons Co., Edw.	1078
Rietz Mfg. Co.	1231
Ross & Son Co., Inc., Charles	983-985
Smith Co., T. L.	986
Sonic Engineering Corp.	1122
*Sprout, Waldron & Co., Inc.	846-848
Strong-Scott Mfg. Co.	1274-1276-1278
*Sturtevant Mill Co.	421
Supreme Div., Franklin P. Miller & Son, Inc.	1010
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
U. S. Mixers, Div. of Stockdale Engineering Co.	1237
Western Machinery Co.	1044-1046
Young Machinery Co., Inc., The	1087

### MOLDING MACHINERY

Carver, Inc., Fred S.	90
*Stokes Corp., F. J.	38 & 67

### MOTORS, ELECTRIC

*Allis-Chalmers Mfg. Co.	636
*Allis Co., Louis	100
Bragar Co., Inc., Norman	1230-1232
Fairbanks, Morse & Co.	1323-1325-1327
*General Electric Co.	482
Glascote Products, Inc.	596
*Reliance Electric & Engineering Co.	10
*Superior Electric Co.	804
U. S. Electrical Motors, Inc.	837
*Westinghouse Electric Corp.	510
Yuba Consolidated Industries, Inc.	882-884-886

### NAVAL STORES

*Allied Chemical Corp.	955-957-959-961
*Hercules Powder Co.	916
National Rosin Oil Products, Inc.	917

### NITRATORS

Knight, Maurice A., Co.	586
Tolhurst Centrifugals Div., American Machine & Metals, Inc.	506

### NOZZLES, SPRAY

Chain Belt Co.	1416
Delavan Mfg. Co.	1354-1356
*Duriron Co., Inc.	520 & 532
Grinnell Co., Inc.	566
Heat Transfer Div., National-U. S. Radiator Corp.	850
Industrial Plastic Fabricators, Inc.	1102
Mazzoni, G., S. P. A.	1412
Monarch Mfg. Works, Inc.	881
National-U. S. Radiator Corp.	850

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



Rockwood Sprinkler Co., Div. of  
The Gamewell Co. .... 1238-1271-  
1272-1273  
Schutte and Koerting Co. .... 61  
Scientific Glass Apparatus Co.,  
Inc. .... 332  
\*Spray Engineering Co. .... 1229  
\*Spraying Systems Co. .... 914  
Steinen Mfg. Co., Wm. .... 1194-1196  
\*Strahman Valves, Inc. .... 815  
\*Yarnall-Waring Co. .... 49

#### OVENS, ELECTRIC LABORATORY

American Instrument Co., Inc. .... 445  
American Sterilizer Co. .... 366  
Brabender Corp. .... 37  
Brabender Instruments, Inc.,  
C. W. .... 340  
Brinkmann & Co., Inc., C. A. .... 360  
Colton Co., Arthur Div., Snyder  
Corp. .... 50  
Electric Hotpack Co., Inc. .... 373-375  
General Laboratory Supply Co. .... 310  
Laboratory Equipment Co. .... 905  
National Drying Machinery Co.  
1112-1114  
New Brunswick Scientific Co.,  
Inc. .... 324  
New York Laboratory Supply Co.,  
Inc. .... 1022  
Posey Iron Works, Inc. .... 1407  
Precision Scientific Co. .... 370-372  
Proctor & Schwartz, Inc. .... 684  
Scientific Glass Apparatus Co.,  
Inc. .... 332  
Tenso-Lab., Inc. .... 1123  
Welch Mfg. Co., W. M. .... 205

#### OVENS, INDUSTRIAL

\*Allied Chemical Corp. .... 955-957-  
959-961  
American Gas Furnace Co. .... 833  
Colton Co., Arthur Div., Snyder  
Corp. .... 50  
Dean Panel Coil Div., Dean Prod-  
ucts, Inc. .... 184  
Electric Hotpack Co., Inc. .... 373-375  
National Drying Machinery Co. 1112-  
1114  
Posey Iron Works, Inc. .... 1407  
Renneburg & Sons Co., Edw. .... 1078  
Scientific Glass Apparatus Co.,  
Inc. .... 332  
\*Selas Corp. of America. .... 979-981  
Sly Mfg. Co., The W. W. .... 73  
Trent, Inc. .... 195

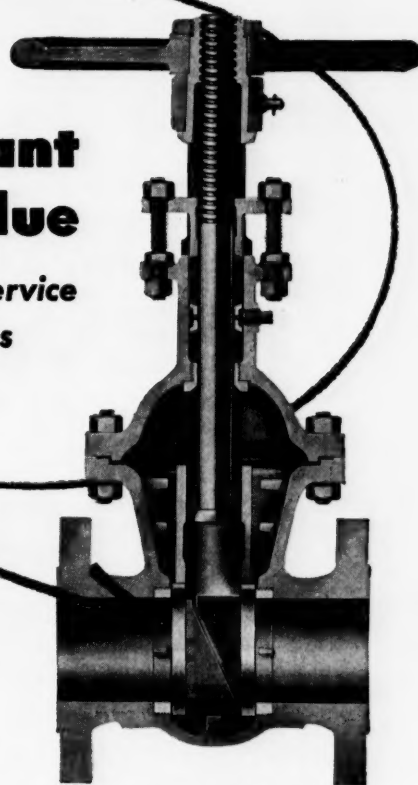
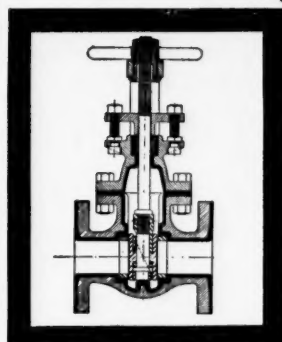
#### PACKAGING EQUIPMENT AND SUPPLIES

Bemis Bro. Bag Co. .... 164-166  
Chemical and Pharmaceutical In-  
dustry Co., Inc. .... 1064  
Colton Co., Arthur Div., Snyder  
Corp. .... 50  
Delaware Barrel & Drum Co., Inc.  
1187-1189-1193  
Fischbein Co., Dave. .... 872  
General Plastics Corp. .... 967  
Glengarry Processes, Inc. .... 60  
Gump Co., B. F. .... 1024-1026  
Jeffrey Manufacturing Co. .... 97  
Lehmann Co., Inc., J. M. .... 1429-  
1431-1446  
Link-Belt Co. .... 165  
Package Research Laboratory  
1261-1263  
\*Pfaudler Permutit, Inc. .... 110 & 141  
\*Richardson Scale Co. .... 1151-1153  
Syntron Co. .... 163  
United Box & Lumber Co. .... 1085

#### PACKING

\*Crane Packing Co. .... 908  
Doré Co., John L. .... 1295-1297

## Important plus-value for corrosive service gate valves



Darling rubber-lined gate valves with special alloy working parts (left) are made for pressures to 150 pounds and temperatures to 150°. Other Darling gate valves come in a wide range of sizes, types and constructions for all normal and unusual services.

**SURE** Darling gate valves are available in the metals or special alloys needed for your particular service . . . and you ought to look into the hard rubber lined iron body type for possible savings. But beyond all that is where the real *plus-value* begins—the result of Darling's fully revolving double disc parallel seat principle!

This principle assures uniform wear distribution, automatic seating compensation, and avoidance of disc-to-seat galling. It means prolonged tight closure, much less maintenance and far less chance of process interruptions!

It's easy to get *all* the facts on Darling plus-values. Just ask for new Catalog No. 57.

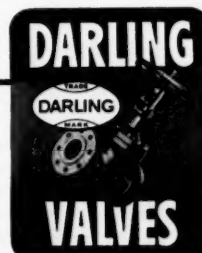
**ENGINEERING SERVICE:** Darling offers unusual facilities for the development and manufacture of special valves for out-of-the-ordinary requirements. This special service is available to you at all times, without obligation.

### DARLING VALVE & MANUFACTURING CO.

Williamsport 3, Pa.

Manufactured in Canada by

Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.

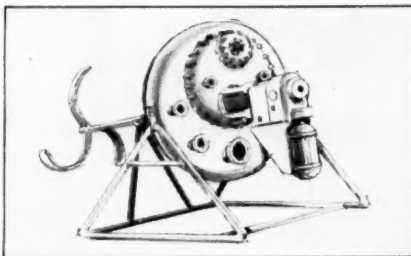


# see what's **NEW IN FLUIDICS\***

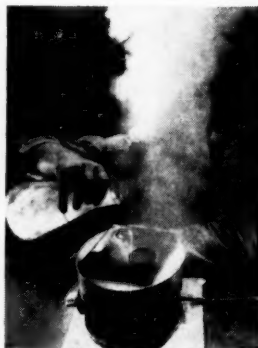
**at the Chem Show**

**Booths No. 110 and 141**

**New RA Series Reactor.** Features BH Drive for quiet, maintenance-free power. Mirror image top head layout for greater ease in piping. Quick-change "Pfaudlerpac" seal or stuffing box. Offset, bottom outlet. Glasteel 59 construction, of course. 300- to 4000-gallon capacity. Also see all-new stainless steel reactor design.



**Improved Material of Construction.** Witness a "live" demonstration of the thermal shock resistance of Glasteel 59 — a full 30% increase over previous glassed steels. Inspect Glasteel 59 construction in new Chemo-Blender, new one-foot dryer blender and the new RA Series reactor.



*For more information, see us at the Chem Show or write our Pfaudler Division, Dept. CE-119, Rochester 3, New York.*

**Utilize FLUIDICS locally,** almost anywhere in the world. Along with its four plants in the United States, Pfaudler Permutit has manufacturing facilities in the following countries:

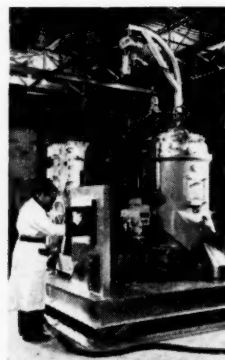
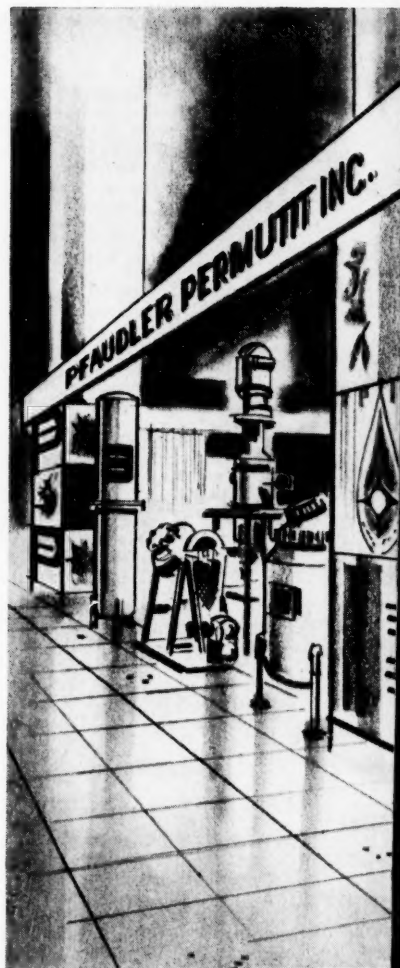
**Germany:** Pfaudler-Werke A. G.

**Great Britain:** Enamelled Metal Products Corp. Ltd.

**Canada:** Ideal Welding Co. Ltd.

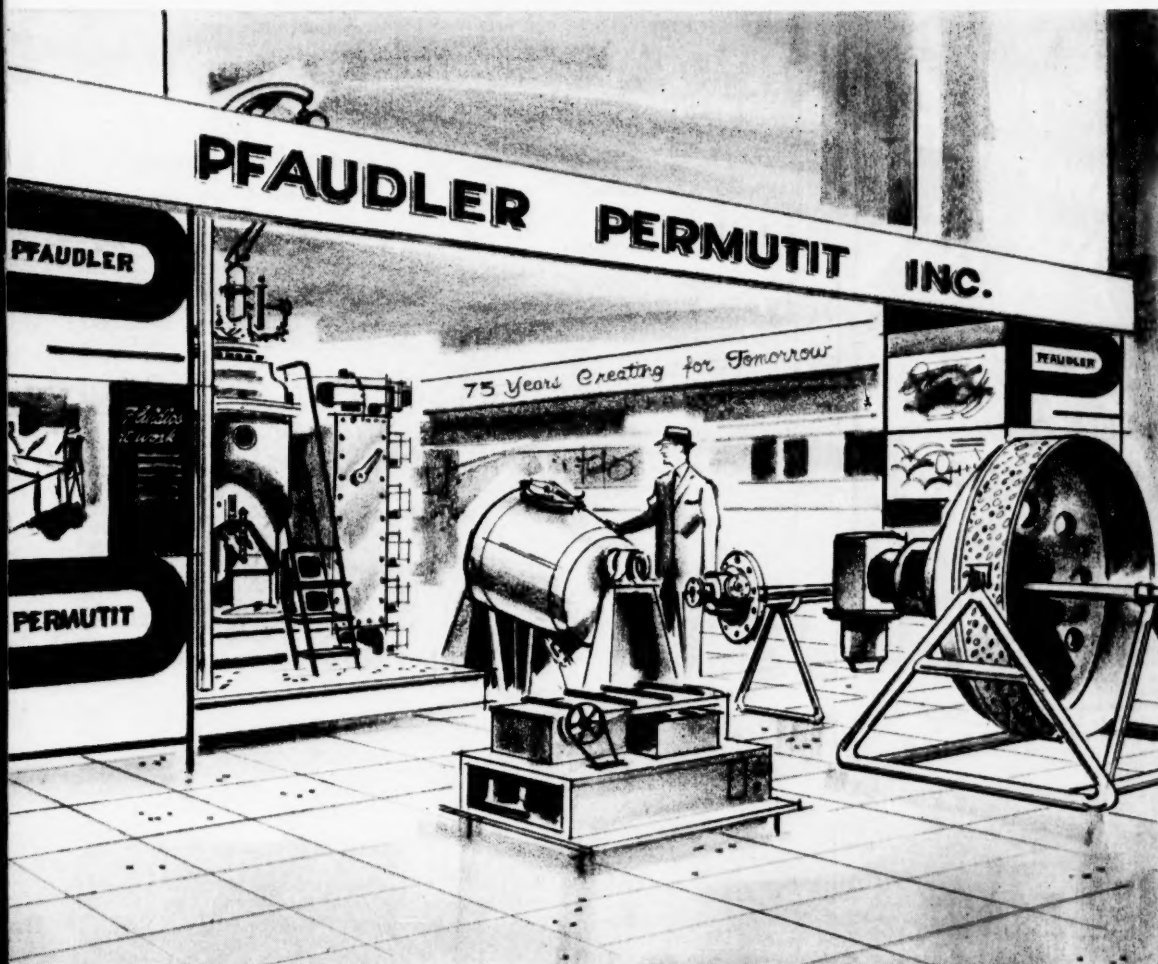
**Mexico:** Arteacero-Pfaudler, S. A.

**Japan:** Shinko-Pfaudler Co., Ltd.

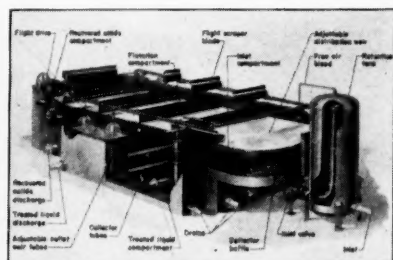


## **New Inline Test Centrifuge.**

Simply connect product and utilities to the Titan Superjector Test assembly and you start full-scale production evaluation. Make liquid-solid or liquid-liquid-solid separations up to 6000 gallons per hour. Automatic desludging. Sign up for a field test or implant evaluation program during the show.



**100% Corrosion-Resistant Heaters.** Pfaudler tantalum bayonet heaters have virtually zero corrosion rate in most corrosive environments. They have high heat-transfer rate with no fouling and offer excellent resistance to physical and thermal shocks. You can get heaters with 1½" and 2" O.D. tubes, single or multiple clusters, up to 15 square feet of heat-transfer area.



**New for Industrial Waste Treatment.** Inspect a working model of the Permutit Colloidair Separator. See how dissolved air is used to "bubble" solid wastes from liquids. Applications range from paper mills to refineries.

\*FLUIDICS is the Pfaudler Permutit program that integrates knowledge, equipment and experience in solving problems involving fluids.



**Pilot Size Zirconium Reactor.** Fifty-gallon capacity with a .065" zirconium liner. Designed for 150 psi at 350°F. Also displayed will be a 30-gallon tantalum-lined agitated reactor.



**PFAUDLER PERMUTIT INC.**

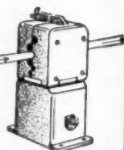
Specialists in FLUIDICS... the science of fluid processes

# PUMPING IDEAS

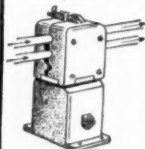
## POSSIBLE ONLY with a SIGMAMOTOR PUMP

### Move Corrosive Liquids

Material being pumped never comes in contact with pump mechanism. Wave-like motion of steel fingers forces material through Tygon tubing. By changing size of tubing, capacity can be increased or decreased. Pump housing opens for removal and insertion of tubing.



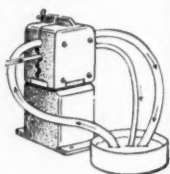
### Pump 2 or 3 Different Liquids Simultaneously



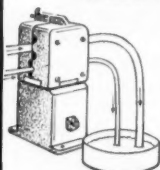
Some models will accommodate up to four tubes so that four different liquids can be passed through the pump at one time without danger of contamination.

### Feed and Mix

One or more tubes can be feeding material to a mix while a larger tube is recirculating the liquid to produce agitation and thorough mixing. Viscous materials can be pumped without danger of gumming or plugging. Remove tube and pump is clean.



### Meter Additives



One or more additives can be pumped to a solution in the exact amount desired by selecting the correct size of tubing and regulating pump speed. Various controls can be incorporated to close valves ahead of pump.

Capacities from 0.5 cc. per min. to 4.5 G.P.M.

Write for complete information on sizes, capacities.

## SIGMAMOTOR INC.

17 N. Main Street  
Middleport, N. Y.

SEE US AT BOOTH NO. 1099

## SHOW DIRECTORY . . .

Durametallic Corp. ....	1216
Ethylene Corp. ....	971
*Garlock Packing Co. ....	415
General Ceramics Corp. ....	131
*Johns-Manville Sales Corp. ....	172-176
Kearbey & Mattison Co. ....	822
*Raybestos-Manhattan, Inc. ....	820
Sealol Corp. ....	1281

### PAPER MACHINERY

Artisan Metal Products. ....	874
*Day Co., J. H., Div. of Cleveland Automatic Machine Co. ....	121-122
Dean Panel Coil Div., Dean Products, Inc. ....	184
Gifford-Wood Co. ....	219
Great Western Mfg. Co. ....	216
*Komline-Sanderson Engineering Corp. ....	1307-1309
Morehouse-Cowles, Inc. ....	814
Nichols Engineering & Research Corp. ....	624
RKL Controls, Inc. ....	1405
Renneburg & Sons Co., Edw. ....	1078
Southwestern Engineering Co. ....	1250-1252
*Sprout, Waldron & Co., Inc. ....	846-848

### PELLETING MACHINERY

California Pellet Mill Co. ....	1360
*Daffin Mfg. Co. ....	1400-1404
*Nichols Engineering & Research Corp. ....	624
Patterson Foundry & Machine Co. ....	154
*Sprout, Waldron & Co., Inc. ....	846-848
Taylor Stiles & Co. ....	1357

### PERFORATED METALS

Bishop & Co., Platinum Works, J. ....	900-902
*Fansteel Metallurgical Corp. ....	617
General Alloys Co. ....	193
Scientific Development Co. ....	382
Terriss Div., Consolidated Siphon Supply Co., Inc. ....	1329-1331

### PETROLEUM PRODUCTS

*Allied Chemicals Corp. ....	955-957-959-961
Continental Oil Co. Petrochemical Dept. ....	930
*Enjoy Co., Inc. ....	944-946-948
Voss Co., Inc., J. H. H. ....	1224

### pH EQUIPMENT

*Allis-Chalmers Mfg. Co. ....	636
American Instrument Co., Inc. ....	445
Analytical Measurements, Inc. ....	314
Beckman Instruments, Inc., Scientific & Process Instrument Div. ....	333
Brinkmann & Co., Inc., C. A. ....	360
Cambridge Instrument Co., Inc. ....	376
Coleman Instruments, Inc. ....	320
*Foxboro Co., The. ....	519
General Laboratory Supply Co. ....	310
Milton Roy Co. ....	610
*Minneapolis-Honeywell Regulator Co. ....	635
New Brunswick Scientific Co., Inc. ....	324
New York Laboratory Supply Co., Inc. ....	1022
Photovolt Corp. ....	389
Precision Scientific Co. ....	370-372

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

Research Controls. ....	1186
Scientific Glass Apparatus Co., Inc. ....	332
Tenso-Lab., Inc. ....	1123
Welch Mfg. Co., W. M. ....	205

### PHARMACEUTICAL MACHINERY

Alsop Engineering Corp. ....	381
American Tool & Machine Co. ....	862
*Artisan Metal Products. ....	874
Bartlett & Snow Co., C. O. ....	569
Bucket Elevator Co. ....	1038
Chemical and Pharmaceutical Industry Co., Inc. ....	1064
*Chemicolloid Laboratories, Inc. ....	618
Cherry-Burrell Corp. ....	1039-1045-1049
Cog Corp., The, Div. of Motograph, Inc. ....	1388
Colton Co., Arthur Div., Snyder Corp. ....	50
Cornell Machine Co. ....	1212
Coulter Industrial Sales Co. ....	1444
*Day Co., J. H. Div. of Cleveland Automatic Machine Co. ....	121-122
*Dean Brothers Pumps, Inc. ....	1245-1247-1249
*De Laval Separator Co. ....	94
Eimco Corp. ....	80
Ertel Engineering Corp. ....	623
Fitzpatrick Co., W. J. & Fitzpatco Corp. ....	64
Fluid Energy Processing & Equipment Co. ....	813
*General American Transportation Corp. ....	435-436-442-446-495
Gifford-Wood Co. ....	219
Great Western Mfg. Co. ....	216
Gump Co., B. F. ....	1024-1026
Hockmeyer & Co., Herman. ....	1178
Hunt Machine Co., Rodney. ....	1240-1242-1244
International Process Equipment Co., Inc. ....	812
Lawrence Pumps, Inc. ....	852
Lee Metal Products Co., Inc. ....	1384
Lehman Co., Inc., J. M. ....	1429-1431-1446
*Morehouse-Cowles, Inc. ....	814
*Patterson-Kelley Co., Inc. ....	188 & 215
*Pfaudler Permutit, Inc. ....	110 & 141
Podbielniak, Inc. ....	595
*Premier Mill Corp. ....	1391
RKL Controls, Inc. ....	1405
*Ross & Son Co., Inc., Charles. ....	983-985
Simon-Carter Co. ....	1096
Smith Co., T. J. ....	986
Southwestern Engineering Co. ....	1250-1252
Star Tank & Filter Corp. ....	233
*Stokes Corp., F. J. ....	38 & 67
*Sturtevant Mill Co. ....	421
Torriss Div., Consolidated Siphon Supply Co., Inc. ....	1329-1331
*Tolhurst Centrifugal Div., American Machine & Metals, Inc. ....	506
Tri-Homo Corp. ....	214
U.S. Mixers, Div., of Stockdale Engineering Co. ....	1237
Vac-U-Max. ....	1195-1197
Wilmot Castle Co. ....	1033
Yeomans Brothers Co. ....	1156

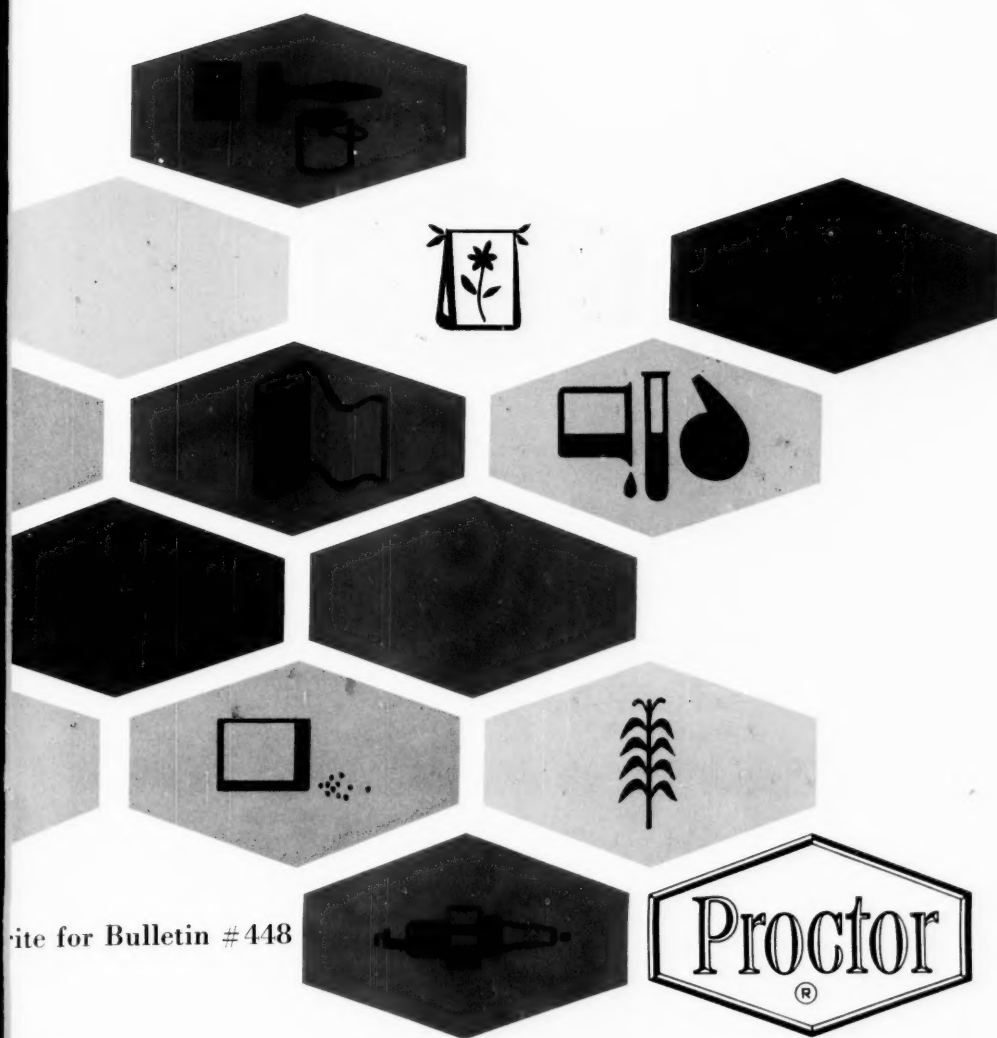
### PIGMENTS

*Allied Chemical Corp. ....	955-957-959-961
Aluminum Co. of America. ....	559
Lead Industries Association. ....	816

Code number  
for this advertisement  
371-372➔



# PROCTOR Drying Equipment for the Food, Chemical and Process Industries... Conveyor Dryers, Spray Dryers, Tray Dryers Truck Dryers... Continuous Automatic Production of the World's Finest Products



ite for Bulletin #448

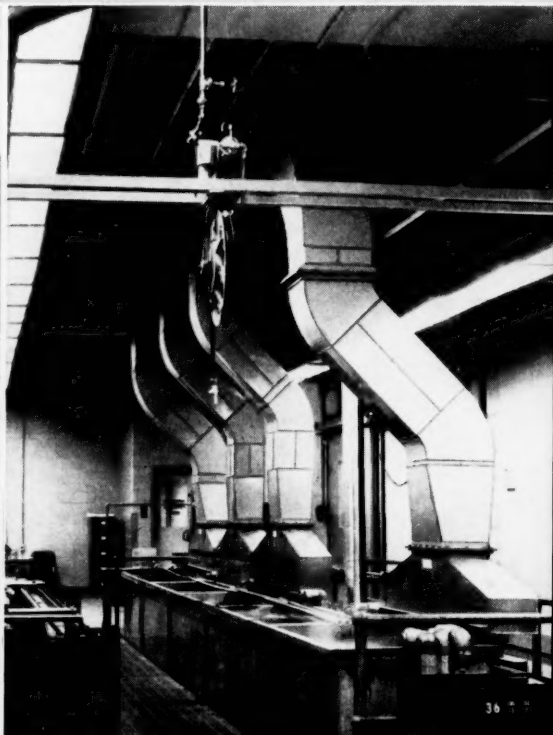
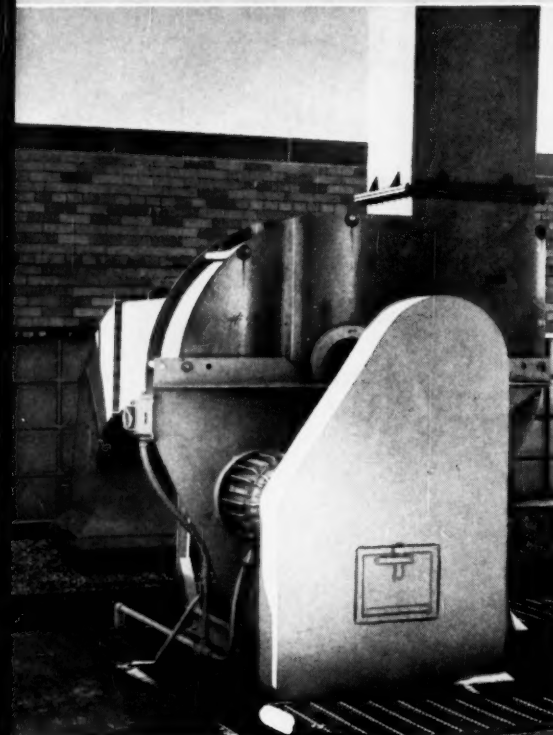


PROCTOR & SCHWARTZ INC., 7th St. & Tabor Rd., Philadelphia 20, Pa.

## Industrial Plastic Fabricators, Inc. reports . . .

Lightweight Boltaron 6200 roof installations require far less structural support.

Complete Boltaron 6200 installation... ducts, tanks, hoods, blowers.



# *Boltaron*® 6200

**handles chemical & industrial fumes**

**See Boltaron 6200  
BOOTH 1106**

**27th Exposition of the Chemical Industries  
New York • Nov. 30 - Dec. 4**

### *Boltaron* 6200

**IS BEST BECAUSE:**

- Protects against most corrosive fumes and liquids in any combination.
- Resists build-up of residual materials from corrosive fumes and liquids.
- Solid Boltaron has no coatings to peel or chip — does not require recoating or repainting.
- Chemically inert.
- Non-toxic, imparts no taste or odor.
- Can be welded, bolted, threaded, milled, ground, buffed and polished.
- Non-sparking — will not support combustion — handles fumes and liquids.
- High dielectric strength.
- Extremely lightweight — non-porous — and smooth surface.
- Tensile strength is 8000 psi.
- Can be joined by heat welding, solvent cementing, and threading.

IPF systems fabricated from Boltaron 6200 are being used across the country by many progressive manufacturers to solve a wide variety of industrial problems, especially where corrosive fumes and liquids have been extremely costly to handle. Performance proves Boltaron 6200 systems help decrease operating costs—increased operating efficiency.

For further information on performance-proven Boltaron 6200 systems, call or write:

Industrial Plastic Fabricators, Inc., Endicott Street, Norwood, Mass.



**THE GENERAL TIRE & RUBBER COMPANY • Bolta Products Division • Lawrence, Mass.**

# HOW **HERCULES** HELPS...



Photo courtesy Asplundh Tree Expert Co., Jenkintown, Pa.

**MEN OVER THE WIRE**—Spiralloy®, the filamentwound glass fiber-reinforced plastic material made by Hercules, is being used for booms on truck-mounted cranes of utility companies and tree surgeons. Since it is a nonconductor of electricity, Spiralloy

is particularly well-suited for this application. Lighter than aluminum and stronger than steel, it has unmatched high-strength-to-weight ratio. Spiralloy-wound cylindrical structures also are gaining acceptance in such fields as missiles, boats, pipe, and storage tanks.



**INCREASE SHOE LIFE**—A new Hercules material now goes into specially impregnated leather shoe soles that actually “breathe” and have many times the wearability of leather soles. Developed in cooperation with the U. S. government, this product has already proven itself in many types of footwear.

**MAKE DRIVING ECONOMY**—Among the many Hercules items that go into your automobile is Dalpac® 4, Hercules di-tert-butyl-p-cresol. This antioxidant is added to gasoline at the refinery to inhibit gum formation, stabilize color and help maintain engine cleanliness. It means more trouble-free miles of driving for you.



## HERCULES

**HERCULES POWDER COMPANY**

INCORPORATED  
900 Market Street, Wilmington 99, Delaware

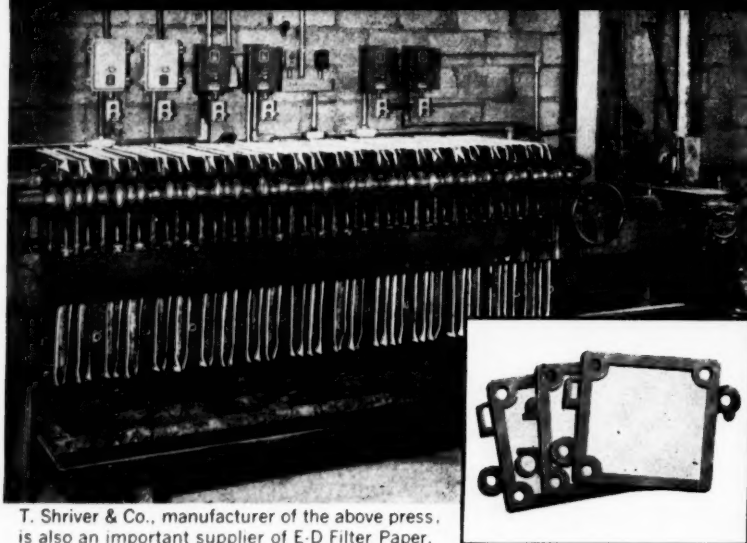
**CHEMICAL MATERIALS FOR INDUSTRY**



money-saving  
combination  
for tough  
filtration jobs

plate and frame press dressed with  
low-cost, readily available

**Eaton-Dikeman**  
filter paper



T. Shriver & Co., manufacturer of the above press, is also an important supplier of E-D Filter Paper.

"In the refining of imported vegetable waxes," says Mr. A. A. Arnold of the Frank B. Ross Co., Inc. of Jersey City, "it's essential that you use an efficient *paper* dressing which can be thrown away *after one usage*. This is because the wax that hardens on the dressing when the filter is dumped makes it impractical to reclaim *any kind* of filter sheet."

Furthermore, the filter paper should be of a grade that will permit the molten wax to filter with ease, and should disintegrate readily when grinding the filter cakes before solvent extraction. Results have shown Eaton-Dikeman grades 633 and 634 are ideal for this purpose.

These are but two of the 39 E-D standard grades now available to meet practically any process requirement. Let us know your special problems; our filtration experts will be happy to cooperate with you at any time. Meantime send for sample folder of most popular E-D Filter Papers TODAY!

Be sure to visit THE EATON-DIKEMAN Exhibit... Booth No. 1120 at the Chem Show in New York



**THE EATON-DIKEMAN COMPANY**

Filtertown

MOUNT HOLLY SPRINGS, PENNSYLVANIA

"First with Filter Paper exclusively."

#### SHOW DIRECTORY . . .

Minerals & Chemicals Corp. of  
America . . . . .950

#### PIPE AND FITTINGS

Alloy Products Corp. . . . .1205  
\*Aluminum Co. of America . . . . .559  
Ameco Metal, Inc. . . . .412  
\*Babcock & Wilcox Co., Tubular  
Products Div. . . . .1002-1004-1006  
Barco Mfg. Co. . . . .439  
Barnstead Still and Sterilizer  
Co. . . . .416  
Beckley, Halton & Hickman . . . . .1342-  
1363  
Bel-Art Products . . . . .889  
Byers Co., A. M. . . . .1051  
Carlson Products Corp. . . . .1436  
Carpenter Steel Co., Alloy Tube  
Div. . . . .675  
Cherry-Burrell Corp. . . . .1039-1045-  
1049  
\*Cooper Alloy Corp. . . . .103  
\*Corning Glass Works . . . . .134  
\*Crane Co. . . . .422  
Crucible Steel Co. of America . . . . .1424-  
1426-1428  
Curtiss-Wright Corp., Metals  
Processing Div. . . . .1344-1346  
Dore's Co., John L. . . . .1295-1297  
\*Duriron Co., Inc. . . . .520 & 532  
Ethylene Corp. . . . .971  
Ever-Tite Coupling Co., Inc. . . . .1159  
Falls Industries, Inc. . . . .131  
Fibercast Co., Div., Youngstown  
Sheet & Tube Co. . . . .870  
Galigher Co. . . . .843  
Glascote Products, Inc. . . . .596  
Grinnell Co., Inc. . . . .566  
\*Havag Industries, Inc. . . . .546  
\*Haynes Stellite Co., Div. Union  
Carbide Corp. . . . .460-470  
Heil Process Equipment Corp. . . . .1305  
Imperial Brass Mfg. Co. . . . .894-896  
Industrial Plastic Fabricators,  
Inc. . . . .1102  
Jacoby-Terbox Corp. . . . .1362  
\*Johns-Manville Sales Corp. . . . .172-176  
Knapp Mills Inc. . . . .175  
Knight Co., Maurice A. . . . .586  
Laboratory Furniture Co. . . . .309  
Ladish Co. . . . .63  
\*Lapp Insulator Co., Inc. . . . .696  
Lead Industries Assn. . . . .816  
Lead Lined Iron Pipe Co. . . . .70  
Nalge Co., Inc. . . . .1201  
\*National Carbon Co. . . . .460-470  
National Tube, Div. of United  
States Steel Corp. . . . .590  
Parker Fittings & Hose Div.,  
Parker Hannifin Corp. . . . .431  
\*Parks-Cramer Co. . . . .55  
\*Pfaudler-Permutit, Inc. . . . .110 & 141  
Potts Co., Horace T., Speedline  
Fittings Div. . . . .980  
\*Republic Steel Corp. . . . .68  
\*Resistoflex Corp. . . . .893-895-897  
Rockwood Sprinkler Co., Div. of  
Gamewell Co. . . . .1238-1271-1272-1273  
\*Saran Lined Pipe Co. . . . .913  
Speedline Fittings Div., Horace T.  
Potts Co. . . . .980  
Star Tank & Filter Corp. . . . .233  
Strong, Carlisle & Hammond . . . . .1121  
Sweeco Tube Corp. . . . .834  
Terriss Div., Consolidated Siphon  
Supply Co., Inc. . . . .1329-1331  
\*Tube Turns Div., Chemetron  
Corp. . . . .98  
Tube Turns Plastics, Inc. . . . .96  
Union Steel Co. . . . .840  
U. S. Hoffman Machinery Corp.,  
Appliance Div. . . . .1365

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



SEE THE LATEST RESULTS OF THE

# BAKER PERKINS

RESEARCH AND DEVELOPMENT PROGRAM

IN **BOOTHS 560-609** AT THE  
27TH CHEMICAL EXPOSITION

**BAKER PERKINS** WILL DISPLAY NEW  
MIXING AND CENTRIFUGAL MACHINERY  
DESIGNED AND BUILT TO BETTER SERVE  
THE CHEMICAL PROCESS INDUSTRIES

- ▶ **NEW VERTICAL BATCH MIXERS**
- ▶ **NEW INTERNAL PRESSURE  
UNIVERSAL CENTRIFUGALS**
- ▶ **NEW VERTICAL PUSHER  
TYPE CENTRIFUGALS**
- ▶ **NEW CONTINUOUS MULTI-STAGE  
BASKET PUSHER TYPE CENTRIFUGALS**
- ▶ **NEW DEVELOPMENTS  
IN KO-KNEADER  
CONTINUOUS MIXERS**



**BAKER PERKINS INC.**

**CHEMICAL MACHINERY DIVISION  
SAGINAW, MICHIGAN**

**AMCHEM PRODUCTS, INC., AMBLER 49, PA.**

Please send me "Data File" and Selection Chart describing uses of Rodine Inhibitors for Industrial cleaning.

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

**CLIP THIS COUPON . . .**

for **SELECTION CHART** on  
Rodine Acid  
Inhibitors  
for **INDUSTRIAL**  
**CLEANING !**



Now—available for the first time—a handy selection guide to let you easily determine the proper class of inhibitors to use for various metals and cleaning media!

Rodine Acid Inhibitors are ideal for all types of specialized industrial cleaning requirements. Rodine effectively inhibits acid solvents used to dissolve deposits in industrial equipment, tanks, and piping systems. Find out how Rodine can protect your investment in costly equipment by eliminating acid erosion.

Get all the facts . . . **TODAY !**



**RODINE**

another chemical development of Amchem Products, Inc.  
(Formerly American Chemical Paint Co.)

AMBLER 49, PA. • Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont.

Amchem and Rodine are registered trademarks of Amchem Products, Inc.

**SHOW DIRECTORY . . .**

\*U. S. Stoneware Co. ....111  
Victaulic Co. of America...1190-1192

**PLANTS, CHEMICAL**

\*Allied Chemical Corp. ....955-957-959-961  
\*Artisan Metal Products .....874  
Bartlett & Snow, C. O. Co. ....569  
Blaw-Knox Co. ....581  
Carver, Inc., Fred S. ....90  
Distillation Engineering Co. ....1048  
\*Dorr-Oliver Inc. ....531  
\*Kennedy Van Saun Mfg. & Engrg. Corp. ....1036  
Knapp Mills Inc. ....175  
Knight Co., Maurice A. ....586  
Mazzoni, C., S. P. A. ....1412  
\*Pfaudler-Permutit, Inc. ....101 & 141  
Rockwood Sprinkler Co., Div. of Gamewell Co. 1238-1271-1272-1273  
Southwestern Engineering Co. 1250-1252  
Star Tank & Filter Corp.....233

**PLASTICS**

\*Allied Chemical Corp. ....955-957-959-961  
Appareils Gachot .....1095  
Bel-Art Products .....889  
Byers Co., A. M. ....1051  
Chemplast, Inc. ....1092  
Colonial Plastics Mfg. Co. ....1283  
\*Crane Co. ....422  
\*Crane Packing Co. ....908  
Delaware Barrel & Drum Co., Inc. ....1187-1189-1193  
Doré Co., John L. ....1295-1297  
\*Duriron Co., Inc. ....520 & 532  
\*Du Verre, Inc. ....891  
\*Enjay Co., Inc. ....944-946-948  
Ethylene Corp. ....971  
Frank Chemical Co., Inc., J. P. ....921  
\*Garlock Packing Co. ....415  
General Plastics Corp. ....967  
Great Western Mfg. Co. ....216  
\*Haveg Industries, Inc. ....546  
Heil Process Equipment Corp. ....1305  
\*Hercules Powder Co. ....916  
Industrial Plastic Fabricators, Inc. ....1102  
Knapp Mills, Inc. ....175  
\*Metal Cladding, Inc. ....1378  
Nalge Co., Inc. ....1201  
Pennsylvania Fluorocarbon Co., Inc. ....969  
\*Raybestos-Manhattan, Inc. ....820  
Sweepco Tube Corp. ....834  
U. S. Stoneware Co. ....111  
\*Westinghouse Electric Corp. ....510

**PLASTICIZERS**

\*Allied Chemical Corp. ....955-957-959-961  
Continental Oil Co. ....930  
\*Devine Mfg. Co., J. P. ....1372  
\*Enjay Co., Inc. ....944-946-948  
Frank Chemical Co., Inc., J. P. ....921  
\*Hercules Powder Co. ....916  
U. S. Borax & Chemical Corp. 918-920  
Victor Chemical Works....936-938, 940-963  
\*Wallace & Tiernan, Inc. ....686

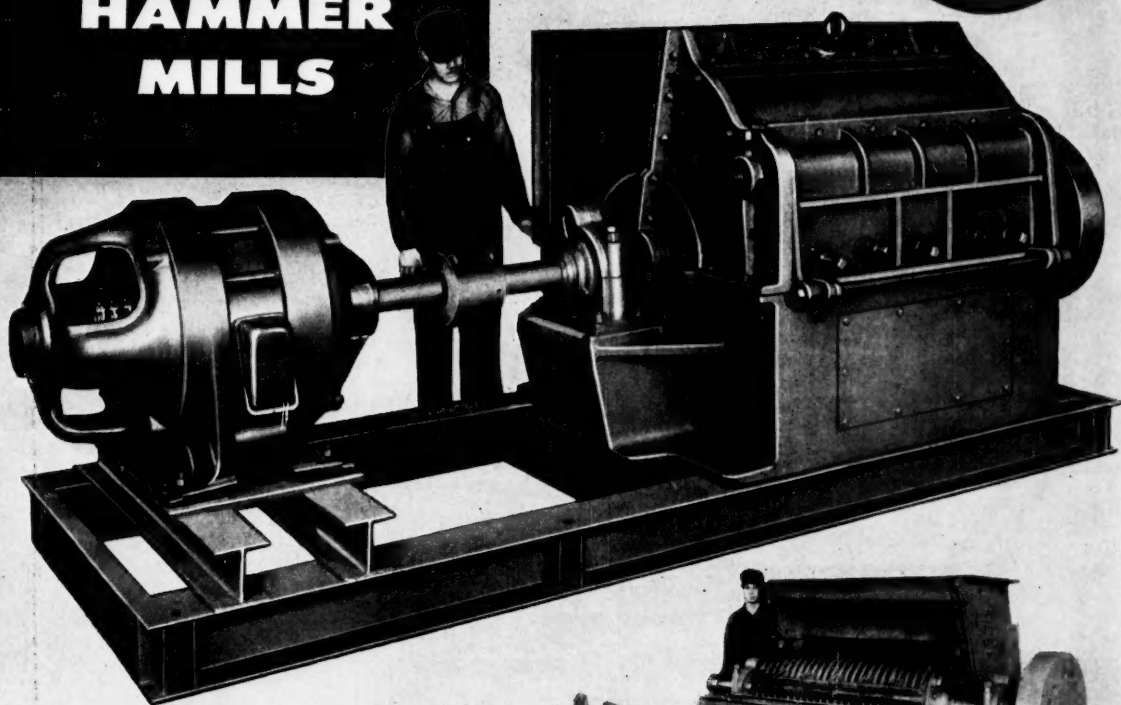
**PLATINUM—WIRE, SHEET, FOIL, CRUCIBLES, LABORATORY WARE**

Bishop & Co., Platinum Works, J. ....900-902  
Catalytic Combustion Corp. ....1209

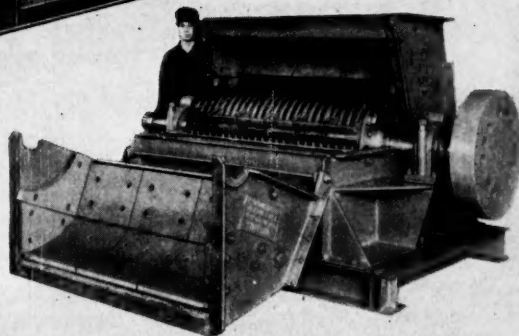
\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

# WILLIAMS *heavy duty* HAMMER MILLS

See Us!  
BOOTH 161  
FIRST FLOOR  
CHEM. SHOW



- **Crushes, Grinds, Shreds To Finished Size In One Operation**
- **Reduces Production Costs Up To 50%**
- **Saves Up To 75% On Equipment Cost**



Williams No. 60 GA Mill with heavy duty steel plate frame. Cover has been opened to show heavy duty manganese steel liners, breaker plates, grate bars and hammers.

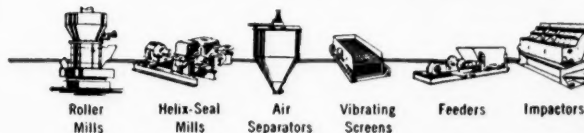
Whether your size reduction job involves crushing, grinding or shredding—whether the material is mineral, chemical, vegetable or animal—Williams has a hammer mill designed to do it from start to finish in a single operation. More uniform product, increased output, plus savings in time and labor can cut production costs as much as half!

Extra primary and secondary crushers are seldom required with a Williams—no extra drives or

conveyors, no costly foundations or buildings for additional crushers are necessary. Expensive maintenance, replacement parts, excessive downtime and labor are reduced to a minimum.

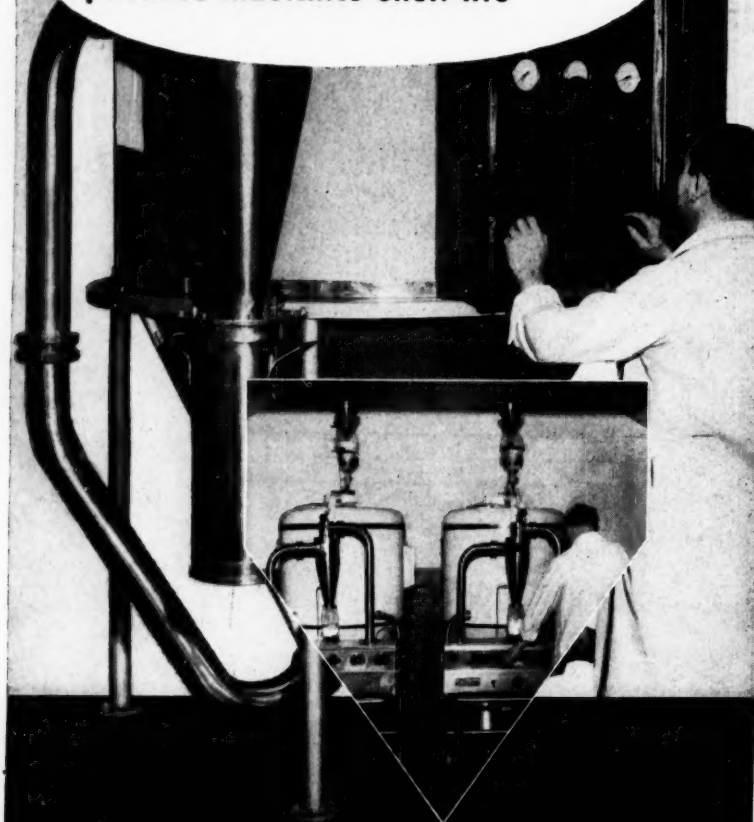
Learn how a Williams hammer mill can step up your output, and improve your product quality. Write—explain your operation—and ask for a catalog.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.  
2706 N. 9th St. St. Louis 6, Mo.



**WILLIAMS**  
CRUSHERS GRINDERS SHREDDERS  
Oldest and Largest Manufacturers of Hammer Mills in the World

**Spray Dried aromatics and perfume bases from Dodge & Olcott possess indefinite shelf life**



Nerco-Niro Spray Dryers now in operation at Dodge & Olcott are playing an important role in the processing of aromatic chemicals and perfume bases. Solutions containing the liquid essence pass through spray dryers where instantaneous evaporation produces dry products of exceptional uniformity in chemical and physical characteristics. This "Gentle-ized" method of rapid drying captures all of the original fragrance and chemical properties in infinitesimal particles and preserves them until time of use.

Nerco-Niro engineers are at your service to discuss and evaluate the advantages of a spray dryer installation in your plant.

Nerco-Niro Spray Dryer Div.

**NICHOLS**



ENGINEERING & RESEARCH CORPORATION

70 Pine St. New York 5, N. Y.

San Francisco

Indianapolis

Montreal

## SHOW DIRECTORY . . .

International Nickel Co., Inc. .... 509  
 \*Metals & Controls Div., Texas Instruments, Inc. .... 1094  
 Tenso-Lab., Inc. .... 1123  
 Welch Mfg. Co., W. M. .... 205

### PORCELAIN WARE

General Ceramics Corp. .... 131  
 Knight Co., Maurice A. .... 586  
 Laboratory Equipment Corp. .... 905  
 Laboratory Furniture Co. .... 309  
 \*Lapp Insulator Co., Inc. .... 696  
 New York Laboratory Supply Co., Inc. .... 1022  
 Scientific Glass Apparatus Co., Inc. .... 332  
 Tenso-Lab., Inc. .... 1123  
 U. S. Stoneware Co. .... 111  
 Welch Mfg. Co., W. M. .... 205

### PRESSES, HYDRAULIC

Carver, Inc., Fred S. .... 90  
 Scientific Glass Apparatus Co., Inc. .... 332  
 Welch Mfg. Co., W. M. .... 205

### PRESSURE RELIEF AND RUPTURE RELIEF DEVICES

Autoclave Engineers .... 346  
 \*Black, Sivalls & Bryson, Inc. .... 669  
 Carbone Corp. .... 803  
 Chem Flow Corp. .... 1227  
 \*Crane Co. .... 422  
 Falls Industries, Inc. .... 131  
 \*Fulton Sylphon Div., Robertshaw-Fulton Controls Co. .... 1293  
 High Pressure Equipment Co., Inc. .... 1215-1217  
 Milton Roy Co. .... 610  
 \*Parks-Cramer Co. .... 55  
 Pressure Products Industries, Inc. .... 1367-1369  
 \*Protectoseal Co. .... 1286  
 Trerice Co., H. O. .... 1287

### PUBLISHERS

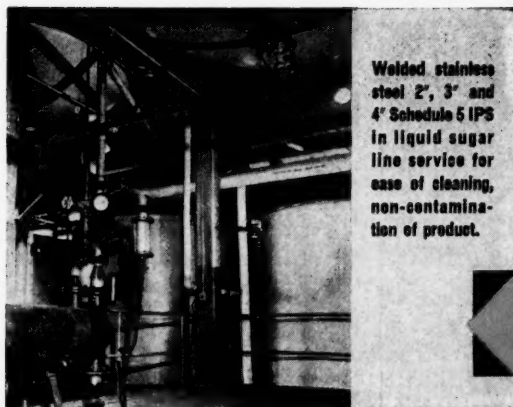
American Chemical Society .... 410  
 American Chemical Society News Service .... 410  
 American Institute of Chemical Engineers .... 1219  
 Analytical Chemistry .... 86 & 410  
 Chemical Abstracts .... 86  
 Chemical Engineering .... 432-481  
 Chemical Engineering Catalog .... 86  
 Chemical and Engineering News .... 86 & 410  
 Chemical Engineering Progress .... 1219  
 Chemical Materials Catalog .... 86  
 Chemical Processing .... 880  
 Chemical Week .... 432-481  
 Food Processing .... 880  
 Gulf Publishing Co. .... 1035  
 Industrial and Engineering Chemistry .... 86 & 410  
 Journal of Agriculture and Food Chemistry .... 86 & 410  
 \*McGraw-Hill Book Co., Inc. .... 974  
 McGraw-Hill Publishing Co. .... 432-481  
 Putman Publishing Co. .... 880  
 Reinhold Publishing Corp. .... 86  
 Van Nostrand Co., Inc., D. .... 866

### PULVERIZERS

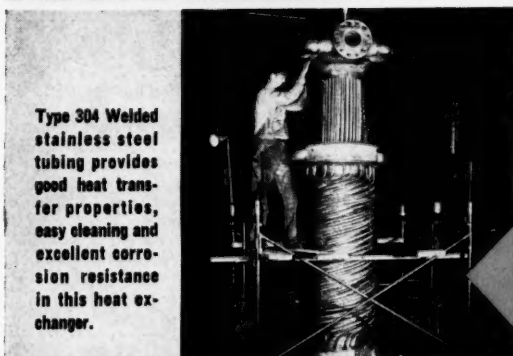
\*Allis-Chalmers Mfg. Co. .... 636  
 Bartlett & Snow Co., C. A. .... 569

\*For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

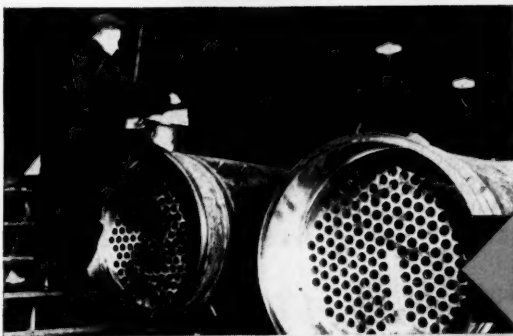




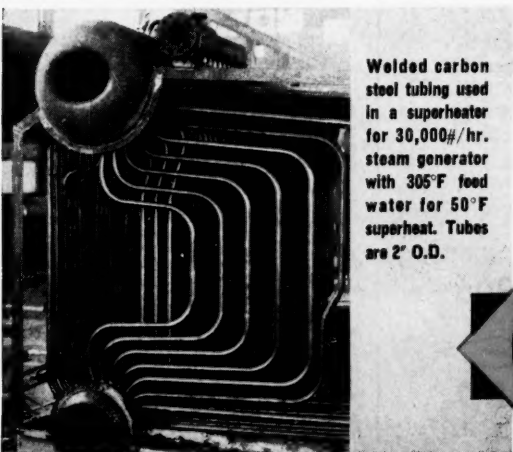
Welded stainless steel 2", 3" and 4" Schedule 5 IPS in liquid sugar line service for ease of cleaning, non-contamination of product.



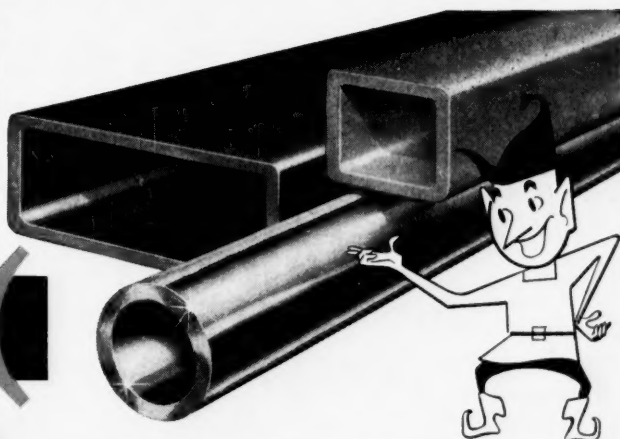
Type 304 Welded stainless steel tubing provides good heat transfer properties, easy cleaning and excellent corrosion resistance in this heat exchanger.



The uniform wall thickness and ductility of welded carbon steel tubing assures uniform rolling-in and tight joints at the tube sheet.



Welded carbon steel tubing used in a superheater for 30,000#/hr. steam generator with 305°F feed water for 50°F superheat. Tubes are 2" O.D.



In Critical Heat Exchanger Applications

Use

# WELDED TUBING

- CARBON
- HIGH ALLOY
- STAINLESS

There's a type of Welded Carbon, High Alloy or Stainless Steel Tubing to meet all code and customer specifications with economy.

The inherent properties of Welded Tubing include uniformity of structure, wall thickness, concentricity and dimensional accuracy unmatched by tubing produced by any other method. Your quality tube producer offers the size and grade for your most exacting requirements. Specify quality Welded Steel Tube.

Write for  
**Bulletin 8591 "Welded Steel Tubing"**



**850 HANNA BUILDING  
CLEVELAND 15, OHIO**

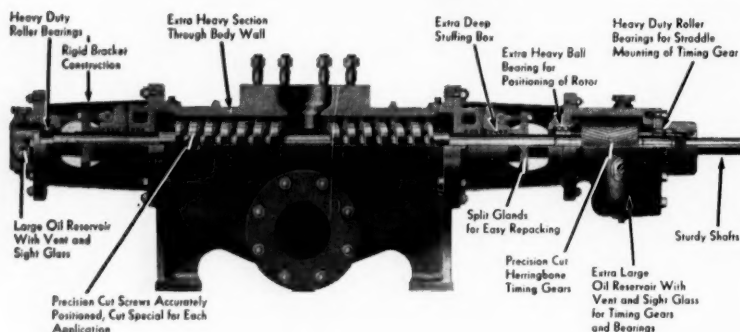
• Armco Steel Corp. • The Babcock & Wilcox Co., Tubular Products Div.  
• The Carpenter Steel Co., Alloy Tube Div. • Clayton Mark & Co. • Damascus Tube Co. • Jones & Laughlin Steel Corp., Electricweld Tube Div. • National Tube Div., United States Steel Corp. • Ohio Seamless Tube Div. of Copperweld Steel Co. • Republic Steel Corp., Steel and Tubes Div. • Revere Copper and Brass Inc., Rome Manufacturing Company Div. • Sawhill Tubular Products, Inc. • Southeastern Metals Co. • The Standard Tube Co. • Standard Tube and T. I. Ltd., (Canada) • Superior Tube Co. • Trent Tube Co., Subs. Crucible Steel Co. of America • Van Huffer Tube Corp. • Wall Tube & Metal Products Co.

LC-597

# THIS PUMP SPECIALIZES IN "IMPOSSIBLE" CHEMICAL PUMPING PROBLEMS

... examine these special features of the

## WARREN EXTERNAL GEAR AND BEARING SCREW PUMP



... then see what it can do:

- Pumps highly viscous liquids or semi-liquids most effectively; discharge pressures nearly unlimited for high viscosity liquids; up to 700 psig for low viscosity liquids, with capacities to 3000 GPM and operating temperatures to 700°F.
- Pumps liquids from systems under high vacuum, with special modifications; has handled vacuums down to 10 microns, with no special seals or without submerging the pump. Mechanical seals are not required.
- Pumps many types of slurries, since it does not trap liquids as gear pumps commonly do.
- Pumps with a constantly high volumetric efficiency because of low internal slippage; is excellent for metering large capacities.
- Pumps quietly and smoothly and is ideal for extruding material where a flawless surface is necessary.
- This highly adaptable Warren External Gear and Bearing Screw Pump, available in an almost endless number of patterns, can solve special space or piping problems too. And it can be furnished with heating or cooling jackets, with hopper type body, and in any metal your problem requires.

Now, consult a Warren engineer  
for help with your "impossible" chemical pumping  
problem or write for detailed Bulletin 206



C-10



**WARREN PUMPS, INC.**

WARREN, MASSACHUSETTS

### SHOW DIRECTORY . . .

Brabender Instruments, Inc., C. W. . . . .	340
Cog Corp., The, Div. of Motion-graph, Inc. . . . .	1388
Combustion Engineering, Inc., Raymond Div. . . . .	646
Denver Equipment Co. . . . .	1146
Entoleter Div., Safety Industries, Inc. . . . .	1599
*Fluid Energy Processing & Equipment Co. . . . .	813
*Hardinge Co., Inc. . . . .	582
Industrial Products Engineering Co. . . . .	1259
*Jeffrey Mfg. Co. . . . .	97
*Kennedy Van Saun Mfg. & Engrg. Corp. . . . .	1036
Pallmann Pulverizers Co. . . . .	1079
Prater Pulverizer Co. . . . .	904-906
*Premier Mill Corp. . . . .	1391
Pulva Corp. . . . .	220
*Pulverizing Machinery Div., Metals Disintegrating Co., Inc. . . . .	632
Rietz Mfg. Co. . . . .	1231
Ross & Son Co., Inc., Charles. . . . .	983-985
Schutz-O'Neill Co. . . . .	1028
Scientific Glass Apparatus Co., Inc. . . . .	332
Southwestern Engineering Co. . . . .	1050-1052
Supreme Div., Franklin P. Miller & Son, Inc. . . . .	1010
*Sturtevant Mill Co. . . . .	421
*Strong-Scott Mfg. Co. . . . .	1274-1276
Tri-Homo Corp. . . . .	214
*Williams Patent Crusher & Pulverizer Co. . . . .	161

### PUMPS

Aldrich Pump Co. . . . .	1108-1110
*Allis-Chalmers Mfg. Co. . . . .	636
Alsop Engineering Corp. . . . .	381
American Instrument Co., Inc. . . . .	445
*American Meter Co., Inc., Pump Div. . . . .	150
Ampco Metal, Inc. . . . .	412
Appareils Gachot . . . . .	1095
Autoclave Engineers . . . . .	346
B-I-F Industries, Inc. . . . .	660
Barish Pump Co., Inc. . . . .	1074
Beckley, Haltom & Hickman . . . . .	1342-1363
Bel-Art Products . . . . .	889
Blackmer Pump Co. . . . .	1129
Chain Belt Co. . . . .	1416
Champion Div., Fostoria Corp. . . . .	659
Cherry-Burrell Corp. . . . .	1039-1045-1049
Clark-Cooper Co. . . . .	1349
*Consolidated Vacuum Corp. . . . .	1353
*Cooper Alloy Corp. . . . .	103
Corley Co., Inc. . . . .	1116
Croll-Reynolds Co., Inc. . . . .	1054
Crossley Machine Co. . . . .	1423-1425
Dean Brothers Pumps, Inc. . . . .	1245-1247-1249
Denver Equipment Co. . . . .	1146
*Dorr-Oliver Inc. . . . .	531
*Duron Co., Inc. . . . .	520 & 532
*Eastern Industries Inc. . . . .	1275
*Eco Engineering Co. . . . .	978
Ertel Engineering Corp. . . . .	623
*Fairbanks, Morse & Co. . . . .	1323-1325-1327
Fischer & Porter Co. . . . .	496
*Fuller Co. . . . .	446
Galigher Co. . . . .	843
General Ceramics Corp. . . . .	131
Goodyear Pumps, Inc. . . . .	1341
*Goulds Pumps, Inc. . . . .	1288-1290-1292-1294

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

*if you are dispersing products like these...*

**CHEMICALS** and kindred products including organic and inorganic chemicals, drugs, medicines, pharmaceuticals, cosmetics, cleaning and polishing preparations, waxes, fertilizers and insecticides, etc.

**PAINTS, VARNISHES, LACQUERS, ENAMELS** and similar coatings.

**PETROLEUM** products including greases, oils, roofing materials, fuels, etc.

**STONE, CLAY** and **GLASS** Products.

**FOOD** and kindred products including meat, dairy, fruit, vegetable, fish, bakery, confectionery, cooking fats, extracts, food preparations, etc.

**TOBACCO** end-products.

**TEXTILE** dyes, finishes, coatings.

**LUMBER & WOOD** coatings.

**PAPER** coatings and glazes.

**PRINTING** inks.

**LEATHER** dyes, special polishes, etc.

**CERAMIC** slips, body materials and glazes.

**METAL** core washes, mold coatings and special protective coatings.

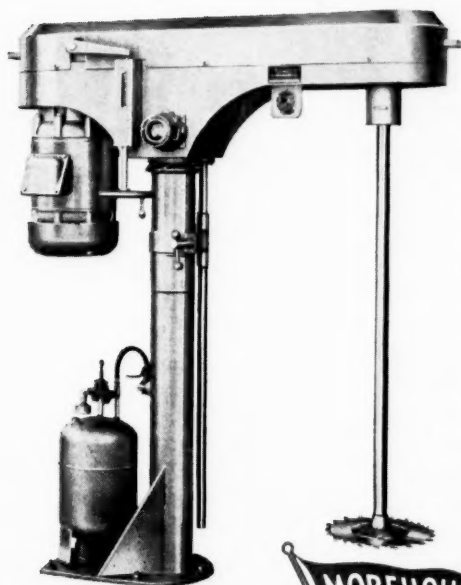
**MISCELLANEOUS** including pencils, crayons, carbon paper coatings, cork products, matches, etc.

**RESEARCH LABORATORIES** and similar services.

# new COWLES **Super** series DISSOLVERS



*with the exclusive new... (Maximum Power Delivery) transmission system*



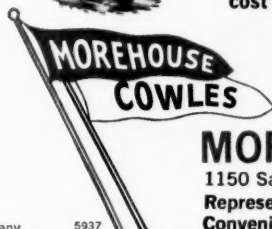
This model:  
Height in lowered position — 83½"  
Height in raised position — 125½"

**will produce many times as much as ordinary mixers... better, in less space, at less cost!**

The new Cowles Super Series Dissolvers are high speed, high shear, impeller-type units. They easily handle viscosities in excess of 50,000 centipoises and are the only full proven units for big plant production as well as small.

Now, in addition to "the teeth that make the BIG difference," the new "MPD" unit, including full instrumentation, offers important advantages not available in any other mixer.

1. It is capable of delivering over 90% motor horsepower to the impeller even at lowest speeds.
2. Speeds may be easily changed during processing operations.
3. Use of proper size motor assures important savings in first cost and power consumption.



*Let us prove it in your plant at our risk!  
Write today for more complete information.*

**MOREHOUSE • COWLES, INC.**

1150 San Fernando Road, Los Angeles 65, California  
Representatives in Principal Cities  
Convenient lease and time-payment plans

\* Trademark of Cowles Dissolver Company.

5937

# STUBBORN LIQUID-SOLID SEPARATION PROBLEM?



Remarkable progress has been made, recently, in the application of centrifugal force.

## ROBERTS CENTRIFUGALS

Unhappy about the product volume which you are able to achieve? Disgruntled about product quality? Why not call in one of our application engineers and treat the problem to a new approach? We have made remarkable progress recently in the application of centrifugal force to materials hitherto considered "out-of-bounds." Chances are we will be able to achieve greater volume and higher quality for you, too.

No charge for consultation . . . Nor for the laboratory tests which usually precede or supplement our recommendations. And if you wish to test our recommended procedures under your own roof, we can supply you with rental machines.

Here's how to get things started! 'Phone us today . . . Hamilton, Ohio—Twinbrook 4-4758 . . . and ask us to set up a conference date at your convenience. You can't lose, and it could be the break you've needed.

DESIGNED WITH YOUR JOB IN MIND

If you have no present problem, but do want the latest centrifugal information, ask for our NEW, FREE BULLETIN NO. 2827.



### SHOW DIRECTORY . . .

High Pressure Equipment Co., Inc.	1215-1217
Hills-McCanna Co.	1173-1174-1175-1176
*Industrial Filter & Pumping Co.	1188-1202
Ingersoll-Rand Co.	128
Jabsco Pump Co.	1016-1018
*Kennedy Van Saun Mfg. & Engrg. Corp.	1036
*LaBour Co., Inc.	42
Ladish Co., Tri-Clover Div.	63
*Lapp Insulator Co., Inc.	696
Lawrence Pumps, Inc.	852
McIntosh Equipment Corp.	1349-1345-1347
Manton-Gaulin Mfg. Co., Inc.	51
Massoni, G., S. P. A.	1412
Melrath Canned Pumps, Inc.	1358
Miller Products Co., Inc.	1091
Milton Roy Co.	610
Mission Mfg. Co.	1417-1419
*Nash Engineering Co.	238
New Brunswick Scientific Co., Inc.	324
New York Laboratory Supply Co., Inc.	1022
Norcross Companies, Sterling R.	991
Peerless Pump Div., Food Machinery and Chemical Corp.	831
Pressure Products Industries, Inc.	1367-1369
RKL Controls, Inc.	1405
Robbins & Myers, Inc., Moyno Pump Div.	1254
Saran Lined Pipe Co.	913
Schutte and Koerting Co.	61
Seavy & Sons, M. J.	1071
*Shriver & Co., Inc., T.	473
Sier-Bath Gear & Pump Co., Inc.	806
*Sigmamotor, Inc.	1099
Sonic Engineering Corp.	1122
Sparkler Mfg. Co.	56
Standard Steel Corp.	153
Stokes Corp., F. J.	38 & 67
Tenso-Lab., Inc.	1123
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Thermon Mfg. Co.	1207
Tri-Rotor, Inc.	1439
Voss Co., Inc., J. H. H.	1224
*Wallace & Tiernan Inc.	686
*Warren Pumps, Inc.	1277-1279
*Waukesha Foundry Co.	1387-1389
Welch Mfg. Co., W. M.	205
Worthington Corp.	545
Yeomans Brothers Co.	1156

### PYROMETERS

*Bailey Meter Co.	46
Cambridge Instrument Co., Inc.	376
New York Laboratory Supply Co., Inc.	1022
Radiation Electronics Co., Div. of Comptometer Corp.	1155-1157
Scientific Glass Apparatus Co., Inc.	332
Sticht Co., Inc., Herman H.	1280
Tenso-Lab, Inc.	1123
*Thermo Electric Co., Inc.	817
Welch Mfg. Co., W. H.	205

### RAW MATERIAL

Allied Chemical Corp.	955-957-959-961
Armour Industrial Chemical Co.	932-934

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



consider the source...

**TRONA**



*from one plant...two essential chemicals*

## BORON and LITHIUM

*for better ceramic products*

In the production of quality ceramic products first consider your raw material source. TRONA\* is a prime supplier of not one but *two* vital chemicals for making enamels and ceramic glazes tougher, harder, more adherent; for making glassware brighter and more durable. As the only producer of both BORON and LITHIUM, American Potash & Chemical Corporation offers these one-source advantages: better understanding of your problems, broader research and development background, and on-the-spot field service.



### **American Potash & Chemical Corporation**

3000 WEST SIXTH STREET, LOS ANGELES 54, CALIFORNIA  
99 Park Avenue, New York 16, New York

Other Sales Offices: SAN FRANCISCO, PORTLAND (Ore.), ATLANTA, CHICAGO, SHREVEPORT, COLUMBUS (O.)

\*TRADENAME AND  
TRADEMARK OF AP&CO

THREE ELEPHANT® BORON CHEMICALS: BORAX • BORIC ACID • V-BOR® REFINED PENTAHYDRATE BORAX • BORIC OXIDE  
PYROBOR® DEHYDRATED BORAX TRONA® LITHIUM CHEMICALS: LITHIUM CARBONATE • BIKALITH® LEPIDOLITE ORES



## 360° screen means ...

**300%\* more USEABLE material per hour  
... with Stokes Tornado Mill**

For performing a wide variety of operations with diverse materials, the versatile Stokes Tornado Mill can't be beat. Its exclusive 360° screen assures an average of 300% more useable material per hour...resists clogging, even in processing wet, sticky and heat sensitive materials. With the Stokes Tornado, you get all these features:

- **proved performance**
- **greater product uniformity**
- **higher production capacity**
- **fast, simple cleaning**
- **economical operation**
- **compact portable design**

Let Stokes give you complete details... plus specific performance comparisons on typical materials. Send for the new Stokes Size Reduction literature—Bulletin 350—today.

*\*Average, based on processing of dry granulation.*

Pharmaceutical Division  
**F. J. STOKES CORPORATION**  
5500 Tabor Road, Philadelphia 20, Pa.

# STOKES

## SHOW DIRECTORY . . .

Continental Oil Co.	930
Dore' Co., John L.	1295-1297
International Nickel Co., Inc.	509
National-U. S. Radiator Corp.	850
Norton Co.	1289-1291
Plastic Metals Div., National-U. S. Radiator Corp.	850
Titanium Alloy Mfg. Div., National Lead Co.	234

## RAYON MATERIAL EQUIPMENT

Baker Perkins, Inc.	560 & 609
International Process Equipment Co., Inc.	812
Knapp Mills Inc.	175
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp.	850
Porter Inc., George K.	1134-1136
Rietz Mfg. Co.	1231
Tri-Homo Corp.	214

## RECORDING INSTRUMENTS

American Optical Co., Instrument Div.	1081
B-I-F Industries, Inc.	660
*Bailey Meter Co.	46
*Barber-Colman Co., Wheelco Instruments Div.	395
Beckman Instruments, Inc., Scientific & Process Instruments Div.	333
Brabender Corp.	37
Cambridge Instrument Co., Inc.	376
Engelhard Industries, Inc.	192-196
Fischer & Porter Co.	496
Foxboro Co., The	519
Hastings-Raydist, Inc.	1020
Milton Roy Co.	610
Mine Safety Appliances Co.	14-16
Norcross Corp.	443
Berkin-Elmer Corp.	386
Potter-Bowser Div., Bowser, Inc.	396
*Robertshaw-Fulton Controls Co., Aeronautical Instrument Div.	1366-1368
Scientific Glass Apparatus Corp., Inc.	332
Taylor Instrument Companies	104
Technicon Controls, Inc.	316
*Thermo Electric Co., Inc.	817
Trerice Co., H. O.	1287
Uehling Instrument Co.	364
Welch Mfg. Co., W. M.	205
*Yarnall-Waring Co.	49

## RECTIFIERS

*Allis-Chalmers Mfg. Co.	636
*Fansteel Metallurgical Corp.	617
*General Electric Co.	482
*I-T-E Circuit Breaker Co.	25
Packed Column Corp.	1171
Perkin Engineering Corp.	996
Raytheon Co., Industrial Apparatus Div.	1442
Syntron Co.	163
Welch Mfg. Co., W. M.	205
*Westinghouse Electric Corp.	510

## REFRACTORIES

Harbison-Walker Refractories Co.	1241-1243
Laboratory Equipment Corp.	905
*National Carbon Co.	460-470
*Norton Co.	1289-1291
Titanium Alloy Mfg. Div., National Lead Co.	234

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

# How Much Steam Should a Steam Trap Trap?

... some answers to commonly asked questions about the primary job of a steam trap

You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap all the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

## A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

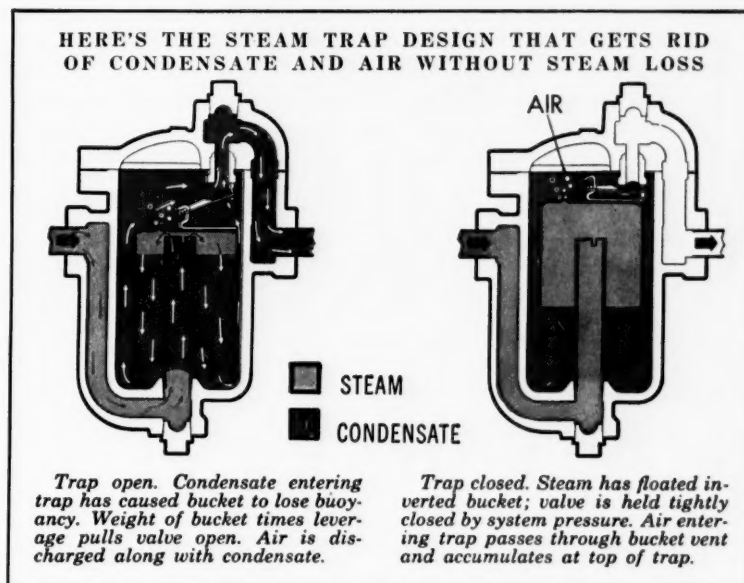
## A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaving steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

## A Steam Trap Should Remove Air and CO<sub>2</sub>

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO<sub>2</sub> goes into solution to form



corrosive carbonic acid which, for example, can eat unit heater tubes. O<sub>2</sub> aggravates the situation. Believe it or not, but all traps don't properly remove air and CO<sub>2</sub>.

By now, you've probably guessed that Armstrong traps *do* remove air and CO<sub>2</sub>. Armstrong design (see illustration) provides continuous venting of air and CO<sub>2</sub>. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

*Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.*

## What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

## Put Up or Shut Up

We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

\* \* \*

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works  
8583 MAPLE ST  
Three Rivers, Michigan



**ARMSTRONG  
STEAM TRAPS**

# STOP!



## COSTLY LEAKS OF VALUABLE FLUIDS

WITH



# DURA SEAL

**THE ENGINEERED MECHANICAL SEAL**

**Savings in product alone will repay the cost of Dura Seal installation**

For further information, write for free Bulletin No. 480 CE



**DURAMETALLIC CORPORATION**  
KALAMAZOO, MICHIGAN

### SHOW DIRECTORY . . .

#### REFRIGERATING EQUIPMENT

American Air Filter Co., Inc.	676
Croll-Reynolds Co., Inc.	1054
Drayer-Hanson Div., National-U. S. Radiator Corp.	850
*Frick Co.	1258-1260
*Fuller Co.	446
Ingersoll-Rand Co.	128
Magnetrol, Inc.	910-912
National-U. S. Radiator Corp.	850
Vogt Machine Co., Henry	124
Voss Co., Inc., J. H. H.	1224

#### REGULATORS, PRESSURE AND TEMPERATURE

*Bailey Meter Co.	46
*Black, Sivalls & Bryson, Inc.	669
Burling Instrument Co.	9
*Eclipse Fuel Engineering Co.	973
Edison Industries, T. A., Instrument Div., McGraw-Edison Co.	945
*Fulton Syphon Div., Robertshaw-Fulton Controls Co.	1293
Leslie Co.	1333
*Rockwell Mfg. Co.	69
*Sarco Co., Inc.	93
Scientific Development Co.	382
Scientific Glass Apparatus Co., Inc.	332
*Strong, Carlisle & Hammond	1121
*Taylor Instrument Companies	104
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Trerice Co., H. O.	1287

#### RESINS AND OILS

*Allied Chemical Corp.	955-957-959-961
*Enjay Co., Inc.	944-946-948
Frank Chemical Co., Inc., J. P.	921
*Hercules Powder Co.	916
National Rosin Oil Products, Inc.	917

#### RESPIRATORS

Mine Safety Appliances Co.	14-16
----------------------------	-------

#### ROTAMETERS

American Gas Furnace Co.	833
*Brooks Rotameter Co.	998
Fischer & Porter Co.	496
Jacoby-Tarbox Corp.	1362
Podbielniak, Inc.	595
Schutte and Koerting Co.	61
Scientific Glass Apparatus Co., Inc.	332
*Wallace & Tiernan, Inc.	686

#### RUBBER PRODUCTS AND EQUIPMENT

American Tool & Machine Co.	862
Automotive Rubber Co., Inc.	802
*Dean Brothers Pumps, Inc.	1245-1247-1249
*Enjay Co., Inc.	944-946-948
Fitzpatrick Co., W. J., & Fitzpatrick Corp.	64
*Garlock Packing Co.	415
Great Western Mfg. Co.	216
Heil Process Equipment Corp.	1305
*Industrial Filter & Pumping Co.	1188-1202
Lehmann Co., Inc., J. M.	1429-1431-1446
*Metal Cladding, Inc.	1378
Miller Products Co., Inc.	1091
North-Erie & American Process Equipment Div., National-U. S. Radiator Corp.	850

Parker Seal Co., Div. of Parker-Hannifin Corp.	431
RKL Controls, Inc.	1405
Raybestos-Manhattan, Inc.	820
Ross & Son Co., Inc., Charles	983-985
*Sargent's Sons Corp., C. G.	1375-1377
Star Tank & Filter Corp.	233
Tri-Homo Corp.	214
U. S. Stoneware Co.	111

#### RUST PROOFING

*Allied Chemical Corp.	955-957-959-961
Carey Mfg. Co., Philip	1152
Galigher Co.	843
International Nickel Co., Inc.	509
Lead Industries Assn.	816
Metal Cladding, Inc.	1378
U. S. Borax & Chemical Corp.	918-920
*Wallace & Tiernan, Inc.	686

#### SAFETY EQUIPMENT

Ampco Metal, Inc.	412
Ansul Chemical Co.	95
Fike Metal Products Corp.	1427
Laboratory Furniture Co.	309
Miller Products Co., Inc.	1091
Mine Safety Appliances Co.	14-16
Nalge Co., Inc.	1201
Pressure Products Co.	1409
*Protectoseal Co.	1286
Rockwood Sprinkler Co. Div., Gamewell Co.	1238-1271-1272-1273
*Strong, Carlisle & Hammond	1121

#### SCALES

Bemis Bro. Bag Co.	164-166
Exact Weight Scale Co.	21
Fairbanks, Morse & Co.	1323-1325-1327
Glengarry Processes, Inc.	60
Gump Co., B. F.	1024-1026
Howe Co., Inc., S.	1029
Mettler Instrument Corp.	339
*Richardson Scale Co.	1151-1153
Scientific Glass Apparatus Co., Inc.	332
*Thayer Scale Corp.	1348-1350-1352
*Toledo Scale	157
Welch Mfg. Co., W. M.	205

#### SCREENS—INCLINED, VIBRATING, GYRATORY

*Allis-Chalmers Mfg. Co.	636
Bartlett & Snow Co., C. A.	569
Buffalo Wire Works Co., Inc.	1381
*Carrier Conveyor Corp.	127
*Davenport Machine & Foundry Co.	818
*Day Co., J. H., Div. of Cleveland Automatic Machine Co.	121-122
De Laval Separator Co.	94
Denver Equipment Co.	1146
Derrick Mfg. Co.	811
Great Western Mfg. Co.	216
Gump Co., B. F.	1024-1026
Hobam, Inc.	1262-1264
Howes Co., Inc., S.	1029
*Jeffrey Mfg. Co.	97
*Kennedy Van Saun Mfg. & Engrg. Corp.	1036
Lehmann Co., Inc., J. M.	1429-1431-1446
Link-Belt Co.	165
Newark Wire Cloth Co.	183
No Vo Div., Industrial Enterprises, Inc.	1030

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



## The Fluid Energy



**Grinds more products  
to finer particle size  
with greater uniformity**

Superior products that command premium prices are produced in the "Jet-o-mizer"—the mill that grinds to the narrowest classification over the broadest range of particle sizes—that produces the highest product uniformity—and at a cost that will surprise you.

We invite you to see what the "Jet-o-mizer" can accomplish for your product, and to compare the results with ANY OTHER FINE GRINDING METHOD!

- Produces particles as low as  $\frac{1}{4}$  micron average—or "coarse grinds" to -200 mesh—or to any in-between size.
- Grinds with NO oversize and MINIMUM under-size at the "coarse" end—or, can produce better than 99% below 3 microns!
- Operates continuously, for any particle size—with no rehandling.
- Insures unsurpassed product uniformity by maintaining perfectly duplicated processing conditions—no batch blending.
- Adjusts for optimum grinding conditions—maximum flexibility—greatest range of products.
- Accomplishes other physical or chemical operations while grinding—oxidation, reduction, coating, dehydration...
- Protects product purity—NO pickup of metal with ordinary materials—negligible contamination with abrasive materials especially with the use of newly developed ceramic and alloy liners.
- Available in laboratory sizes and production models to 8000#/hr.
- High product recovery with patented Jet-o-clone collectors.

**Jet principle grinds with air or steam as grinding fluid—no moving parts—no heat from grinding—low maintenance.**

**Investigate** our record of success in grinding chemicals, pigments, minerals, metals, ceramics, drugs, foods, plastics, abrasives, carbonaceous materials, insecticides, and many others.

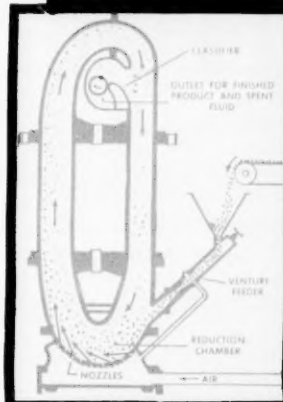
**Investigate** our facilities for product testing and custom grinding.

**Investigate** the extra profit possible with "Jet-o-mizing"!

Visit our Booth 813 at the Chem Show

**FLUID ENERGY  
PROCESSING & EQUIPMENT COMPANY**

Richmond & Norris Sts., Philadelphia 25, Pa.  
(Formerly known as the Wheeler-Stephanoff Mill)



This is one of a battery of fourteen Fluid Energy Mills in the plant of a large talc producer in operation continuously for ten years.

## SHOW DIRECTORY . . .

Patterson Foundry & Machine Co. ....	154
Productive Equipment Corp. ....	224
Simon-Carter Co. ....	1096
Simpson Co., Orville. ....	1150
Southwestern Engineering Co. ....	1250-1252
Sprout, Waldron & Co., Inc. ....	846-848
*Strong, Scott Mfg. Co. ....	1274-1276-1278
*Sturtevant Mill Co. ....	421
Supreme Div., Franklin P. Miller & Son, Inc. ....	1010
Syntron Co. ....	163
Tyler Co., W. S. ....	574
Williams Patent Crusher & Pulverizer Co. ....	161

## SCREENS—OTHER

*Allis-Chalmers Mfg. Co. ....	636
American Plant Equipment Co. ....	1282-1284
Bartlett & Snow Co., C. A. ....	569
Buffalo Wire Works Co., Inc. ....	1381
Dorr-Oliver Inc. ....	531
Newark Wire Cloth Co. ....	183
Niagara Filters Div., American Machine & Metals, Inc. ....	506
No Vo Div., Industrial Enterprises, Inc. ....	1030
*Protectoseal Co. ....	1286
Scientific Glass Apparatus Co., Inc. ....	332
Simon-Carter Co. ....	1096
Syntron Co. ....	163
Tyler Co., W. S. ....	574
*Yarnall-Waring Co. ....	49
York Co., Inc., Otto H. ....	85

## SEPARATORS

*Adams Co., Inc., R. P. ....	836
American Tool & Machine Co. ....	862
Anderson Co., V. D., Div. of International Basic Economy Corp. ....	1265
Baker Perkins, Inc. ....	560 & 609
Bird Machine Co. ....	685
Brown & Co., J. G. ....	1093
Carver, Inc., Fred S. ....	90
*Centrico, Inc. ....	842
Centrifix Corp. ....	1180
Combustion Engineering, Inc., Raymond Div. ....	646
*Crane Co. ....	422
Day Co. ....	45
*De Laval Separator Co. ....	94
Denver Equipment Co. ....	1146
Dorr-Oliver Inc. ....	531
*Frick Co. ....	1258-1260
*Fuller Co. ....	446
Galigher Co. ....	843
*Hardinge Co., Inc. ....	582
Howes Co., Inc., S. ....	1029
*Jeffrey Mfg. Co. ....	97
National Carbon Co. ....	460-470
No Vo Div., Industrial Enterprises, Inc. ....	1030
Peerless Mfg. Co. ....	1008
*Pfaudler Permutit, Inc. ....	110-141
Podbielniak, Inc. ....	595
Purolator Products, Inc. ....	15
Schutte and Koerting Co. ....	61
Schutz-O'Neill Co. ....	1028
*Selas Corp. of America. ....	979-981
*Sharples Corp. ....	485
Simon-Carter Co. ....	1096
Southwestern Engineering Co. ....	1250-1252
Sprout, Waldron & Co., Inc. ....	846-848
*Strong, Carlisle & Hammond. ....	1121

*Strong-Scott Mfg. Co. ....	1274-1276-1278
*Sturtevant Mill Co. ....	421
William Patent Crusher & Pulverizer Co. ....	161
Yeomans Brothers Co. ....	1156
York Co., Inc., Otto H. ....	85

## SHEET METAL WORK

Blickman, Inc., S. ....	325
Day Co. ....	45
Drayer-Hanson Div., National-U. S. Radiator Corp. ....	850
Fansteel Metallurgical Corp. ....	617
General Alloys Co. ....	193
Industrial Products Engineering Co. ....	1259
Koven Fabricators, Inc. ....	74
Multi-Metal Wire Cloth Co., Inc. ....	191
National-U. S. Radiator Corp. ....	850
Renneburg & Sons Co., Edw. ....	1078
Terriss Div., Consolidated Siphon Supply Co., Inc. ....	1329-1331
Young Machinery Co., The. ....	1087

## SIEVES, LABORATORY

Alpine American Corp. ....	1432-1434
Denver Equipment Co. ....	1146
Derrick Mfg. Co. ....	811
General Laboratory Supply Co. ....	310
Great Western Mfg. Co. ....	216
Lehmann Co., Inc., J. M. ....	1429-1431-1446
Newark Wire Cloth Co. ....	183

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

# Going to the Chem Show?

The 27th Biennial Exposition of the Chemical Industries returns to New York bigger and better than ever. And here is your guide to the show, its exhibitors and the products and services they will be offering. This directory will help you pre-select what you want to see, steer you around the four floors and, later, remind you of what you have seen.

At the Show: Don't forget to stop in at the Chemical Engineering Information Center, Booth 432 & 481. Meet the editors and staff.

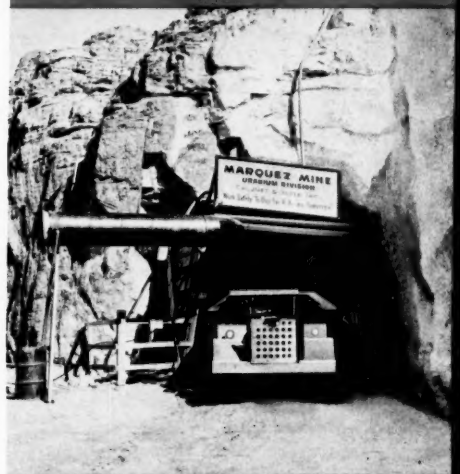


CALUMET DIVISION

## LOOK TO WOLVERINE TUBE

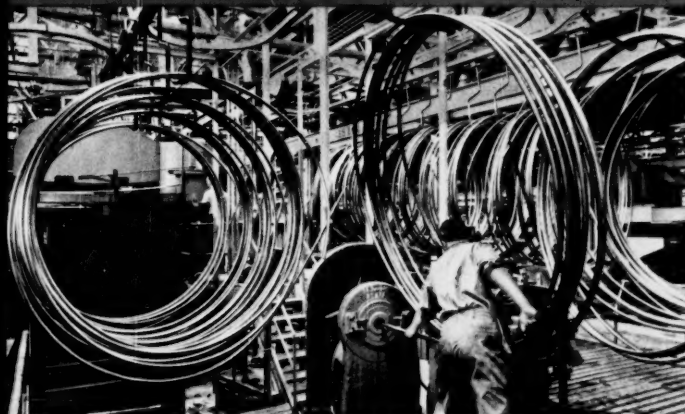


GOODMAN LUMBER DIVISION



URANIUM DIVISION

## LOOK TO CALUMET & HECLA...



WOLVERINE TUBE DIVISION



Mining . . . refining . . . lumbering . . . agriculture . . . manufacturing — diversified indeed are the product and market areas of the companies making up the industrial family of Calumet & Hecla, Inc.

Of course, Calumet & Hecla has for many years been recognized as a copper producer. Since 1859, in Michigan's Upper Peninsula, the Calumet Division has been mining Lake copper — one of the purest forms of copper ore. The refined product is

sent to Wolverine Tube Division for conversion into brass and copper tubing for plumbing installations, refrigeration, chemical and petroleum processing as well as for a wide variety of general industrial applications. Wolverine Tube is also a prime manufacturer of aluminum extrusions, and drawn and extruded aluminum tube.

The Calumet Division is widely recognized for the quality of the grinding balls and mill liners it manufactures for the mining industry, as well as for the agricultural oxides it produces for better farming.

From the trees in the vast forest areas of Calumet & Hecla holdings, Goodman Lumber Division manufactures plywood and other wooden products. C&H properties have turned up high grade uranium. The development of these properties and the extraction of this valuable element is the responsibility of the Uranium Division.

If any of the above products fall within the scope of your company's requirements, remember that you pick a winner every time you deal with a member of the Calumet & Hecla industrial family.

When you need tubing—LOOK TO WOLVERINE!!

CALUMET & HECLA, INC.  
CALUMET DIVISION  
URANIUM DIVISION  
GOODMAN LUMBER DIVISION  
WOLVERINE TUBE DIVISION

In Canada:

CALUMET & HECLA OF CANADA LIMITED  
WOLVERINE TUBE DIVISION  
CANADA VULCANIZER & EQUIPMENT CO. LTD.  
UNIFIN TUBE DIVISION

### WOLVERINE TUBE

DIVISION OF  
CALUMET & HECLA, INC.

17232 Southfield Road  
Allen Park, Michigan

Manufacturers of Quality Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA.

SALES OFFICES IN PRINCIPAL CITIES

Wolverine Trufin is available in Canada through the Unifin Tube Division, London, Ontario.

See Wolverine Tube at Booth 1111—27th Exposition of the Chemical Industries—November 30 through December 4, New York City.

# BUY WOLVERINE HEAT EXCHANGER TUBE . . . the product of EXPERIENCE

Experience, dependability, engineering, research — if these are the things you look for when specifying heat exchanger tube you'll find them—in full measure—at Wolverine Tube. You'll find, in addition, a wide selection of tubing types—each designed to help you increase heat transfer efficiency. These tubes are illustrated and described on this page. You can choose any . . . or all of them . . . secure in the knowledge that no finer tubing is made. May we have your next order?

## PRIME SURFACE TUBE

Wolverine prime surface heat exchanger tube is available in a wide range of sizes in copper, copper alloys and aluminum alloys. It is produced to ASTM Specifications B-111.



## DUPLEX PRIME SURFACE TUBE

Composed of inner and outer tubes of dissimilar metals this tubing is specially designed to handle two different corrosive conditions at the same time. The metal combinations can be those required to combat your corrosion problems.



## WOLVERINE TRUFIN®—THE INTEGRALLY FINNED TUBE

Wolverine Trufin—the original integrally finned tube is manufactured in 7 different types. It is available in external helical low or high fin form or with internal, longitudinal fins. Your Wolverine Sales representative will give you the *complete* story—just ask him next time he calls.



## WOLVERINE U-BEND PALLETS

Here is real convenience. Working to your specifications, Wolverine prefabricates these tubes and ships them to you in disposable box-type pallets—in the exact order of unit installation. They're real time savers that also help you reduce tube inventory. Wolverine U-bends are available in both finned or prime surface form.



## WOLVERINE FIELD ENGINEERING SERVICE



This is a Wolverine "extra"—a staff of highly trained tubing technicians, ready at all time to help you solve heat transfer problems dealing with tubing alloy corrosion or design. Just ask for their services . . . there is no obligation.

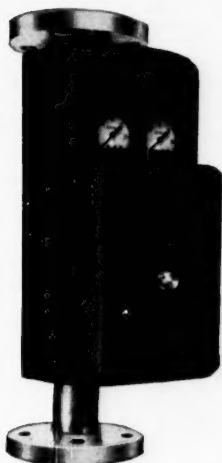
**CALUMET & HECLA, INC.**  
 17232 Southfield Road  
 Allen Park, Michigan 48101  
 In Canada: 1000 Midland Avenue, Toronto, Ontario M6K 3H7

**WOLVERINE TUBE**  
 DIVISION OF  
**CALUMET & HECLA, INC.**  
 17232 Southfield Road  
 Allen Park, Michigan 48101  
 Manufacturing: Drawing, Coiling, Rolling, and Extruding Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA.  
 SALES OFFICES IN PRINCIPAL CITIES  
 Wolverine Trufin is available in Canada through the Unifin Tube Division, London, Ontario



# ANOTHER FIRST FROM BROOKS



## STRAIGHT-THRU FLOW ROTAMETER- TRANSMITTER

**This is the rotameter-transmitter for all your tough fluid metering jobs.** Slurries, still bottoms, Bunker oils, phthalic anhydrides, tall-oil compounds—you name it. Brooks' new armored Model 3611-MPTX with straight-thru flow has no pockets or elbows to gum-up the works. Use it for pneumatic transmission, electric transmission, or integration. However you use it, you can count on dependable operation always: Brooks' unique magnetic position converter sees to that. No blue-sky promises, these are claims we can prove. **And we will—just visit our display at the 27th Exposition of Chemical Industries: Booth 998.**



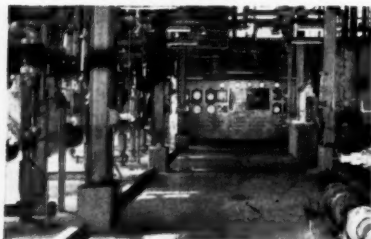
**BROOKS**  
**ROTAMETER COMPANY**  
1159 D STREET  
LANSDALE • PENNSYLVANIA

# NOW" ON ORDER "

## ILLCO-WAY

## ionXchange EQUIPMENT

CORN SYRUP DE-IONIZER USED SINCE 1948



IWT has long been known for successfully applying ionXchange to processes other than water treatment, including such familiar ones as recovery of chromic acid, purification of glycerine to a very high degree, removal of iron from hydrochloric acid, and purification of such organic chemicals as formaldehyde, methanol, and ethylene glycol.

### TYPICAL IONXCHANGERS FROM CURRENT ORDERS INCLUDE THE FOLLOWING

**MILK** A condensed milk plant in Iowa will use ionXchange to reduce calcium content and produce a "soft-curd" milk.

**WINE** An upstate New York wine producer has ordered ionXchange equipment of polished stainless steel for stabilization ("cold-proofing") of wine.

**GLYCERINE** The first full-scale commercial ION EXCLUSION system for de-salting glycerine will be installed in a western chemical plant. A mid-western glycerine producer will install ionXchange equipment to recover USP glycerine from a waste stream, without distillation.

**GRAPE JUICE** An eastern food processor has ordered equipment to remove excess potassium from grape juice.

**CHROMIC ACID** A midwestern auto parts plant will reclaim chrome plating solution at a rate sufficient to pay for the ionXchange equipment in less than a year.

**CITRIC ACID** An eastern producer will remove heavy metals and alkaline earth metals from citric acid by cation exchange.

### OTHERS ARE "IN PROCESS"

We are also building pilot plant equipment and fulfilling research contracts covering a number of other previously untried ionXchange processes, for visitors who have come to us from all over the free world to discuss possibilities of using ionXchange.

### ILLINOIS WATER TREATMENT CO.

840 CEDAR ST., ROCKFORD, ILLINOIS  
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.  
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Ont.

### SHOW DIRECTORY . . .

New York Laboratory Supply Co., Inc. . . . .1022  
No Vo Div., Industrial Enterprises, Inc. . . . .1030  
Scientific Glass Apparatus Co., Inc. . . . .332  
Syntrol Co. . . . .163  
Tenso-Lab, Inc. . . . .1123  
Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .1329-1331  
Tyler Co., W. S. . . . .574

### SIFTERS

Colton Co., Arthur, Div. Snyder Corp. . . . .50  
Day Co., J. H., Div. of Cleveland Automatic Machine Co. . . . .121-122  
Derrick Mfg. Co. . . . .811  
Great Western Mfg. Co. . . . .216  
Gump Co., B. F. . . . .1024-1026  
Hobam, Inc. . . . .1262-1264  
Howes Co., Inc., S. . . . .1029  
Industrial Products Engineering Co. . . . .1259  
No Vo Div., Industrial Enterprises, Inc. . . . .1030  
Posey Iron Works, Inc. . . . .1407  
Simon-Carter Co. . . . .1096  
Sprout, Waldron & Co., Inc. . . . .846-848  
Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .1329-1331  
Tyler Co., W. S. . . . .574

### SILICA

Engelhard Industries, Inc. . . . .192-196  
Harbison - Walker Refractories Co. . . . .1241-1243  
Scientific Glass Apparatus Co., Inc. . . . .332

### SINKS, LABORATORY, ACID PROOF

Alberene Stone, Div. of Georgia Marble Co. . . . .465  
Bel-Art Products . . . . .889  
Blickman, Inc., S. . . . .325  
Browne-Morse Co. . . . .1359  
Colonial Plastics Mfg. Co. . . . .1283  
\*Duralab Equipment Corp. . . . .359  
\*Duriron Co., Inc. . . . .520 & 532  
General Ceramics Corp. . . . .131  
General Laboratory Supply Co. . . . .310  
Heil Process Equipment Corp. . . . .1305  
Industrial Plastic Fabricators, Inc. . . . .1102  
Kewaunee Mfg. Co. . . . .398  
Knapp Mills Inc. . . . .175  
Knight Co., Maurice A. . . . .586  
Laboratory Furniture Co. . . . .309  
Lead Industries Assn. . . . .816  
\*Metal Cladding, Inc. . . . .1378  
Metalab Equipment Corp. Div., of Norbute Corp. . . . .356  
Nalge Co., Inc. . . . .1201  
New York Laboratory Supply Co., Inc. . . . .1022  
Scientific Glass Apparatus Co., Inc. . . . .332  
Sheldon Equipment Co., E. H. . . . .336  
Star Tank & Filter Corp. . . . .233  
Terriss Div., Consolidated Siphon Supply Co., Inc. . . . .1329-1331  
\*U. S. Stoneware Co. . . . .111

### SIZERS

\*Allis-Chalmers Mfg. Co. . . . .636  
Dorr-Oliver Inc. . . . .531  
Pulva Corp. . . . .220  
Simon-Carter Co. . . . .1096  
Southwestern Engineering Co. . . . .1250-1252  
Stokes Corp., F. J. . . . .38 & 67

Supreme Div., Franklin P. Miller & Son, Inc. . . . .1010

### SOLVENT RECOVERY EQUIPMENT

\*Artisan Metal Products . . . . .874  
\*Barnebey-Cheney Co. . . . .52  
Blaw-Knox Co. . . . .581  
Dean Brothers Pumps, Inc. . . . .1245-1249  
Dean Products, Inc. . . . .184  
Denver Equipment Co. . . . .1146  
\*General American Transportation Corp. . . . .435-436-442-446-495  
Glascote Products, Inc. . . . .596  
Niagara Blower Co. . . . .655  
Packed Column Corp. . . . .1171  
\*Patterson-Kelley Co., Inc. . . . .188 & 215  
\*Pfaudler Permutit, Inc. . . . .110 & 141  
Podbielniak, Inc. . . . .595  
Precision Scientific Co. . . . .370-372  
RKL Controls, Inc. . . . .1405  
Scientific Glass Apparatus Co., Inc. . . . .332  
Seavy & Sons, M. J. . . . .1071  
\*Tolhurst Centrifugals Div., American Machine & Metals, Inc. . . . .506  
Vac-U-Max . . . . .1195-1197  
Yeomans Brothers Co. . . . .1156

### SOLVENTS

\*Allied Chemical Corp. . . . .955-957-959-961  
Ansul Chemical Co. . . . .95  
\*Enjay Co., Inc. . . . .944-946-948  
Norcross Companies, Sterling E. . . . .991  
Quaker Oats Co., Chemicals Div. . . . .953

### SPECTROGRAPHS

Brinkmann & Co., Inc., C. A. . . . .360  
Scientific Glass Apparatus Co., Inc. . . . .332  
Welch Mfg. Co., W. M. . . . .205

### SPECTROMETERS

American Optical Co., Instrument Div. . . . .1081  
Appareils Gachot . . . . .1095  
Beckman Instruments, Inc., Scientific & Process Instruments Div. . . . .333  
Coleman Instruments, Inc. . . . .320  
Laboratory Glass & Instruments Corp. . . . .369  
Perkin-Elmer Corp. . . . .386  
Scientific Glass Apparatus Co., Inc. . . . .332  
Welch Mfg. Co., W. M. . . . .205

### SPEED REDUCERS

\*Allis-Chalmers Mfg. Co. . . . .636  
Cleveland Worm & Gear Co. . . . .158  
Link-Belt Co. . . . .165  
\*Philadelphia Gear Works, Inc. . . . .123  
\*Strong-Scott Mfg. Co. . . . .1274-1276-1278  
U. S. Electrical Motors, Inc. . . . .837  
U. S. Mixers, Div. of Stockdale Engineering Co. . . . .1237  
\*Westinghouse Electric Corp. . . . .510

### SPRAY DRYING SYSTEMS

Blaw-Knox Co. . . . .581  
Bowen Engineering, Inc. . . . .706  
\*Nichols Engineering & Research Corp. . . . .624  
Proctor & Schwartz, Inc. . . . .684  
Spraying Systems Co. . . . .914

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

## CREATIVE ENGINEERING TRANSLATED INTO PRACTICAL PRODUCTION

**S**ARGENT imaginative engineering has created numerous "firsts" that are now standard in many industries . . . better drying equipment and methods for better production and better products at less cost.

The first gas-fired rubber dryer was a Sargent. The first flashless powder was dried in a Sargent. The first gas-fired conveyor dryers for tobacco, for grain, for wool stock, all were Sargents. New man-made

textile fibres and innumerable other products have come to the market dried by special-design Sargents that were designed, engineered and built to the exacting needs of product and of production.

From small lab and table models, from tray and truck dryers, through huge capacity, multi section, multi-stage conveyor dryers and rotary dryers, a Sargent is engineered to serve profitably and well for many years to come.

# DRYERS

## by SARGENT

# Lead The Field

- in operating economy
- proven high-level production
- minimum of maintenance requirements
- easiest, quickest cleanout
- dependability of guaranteed performance
- fastest installation, with erection costs the lowest on the market

Let us give you details.

See us at the CHEMICAL SHOW, Booths 1375-1377

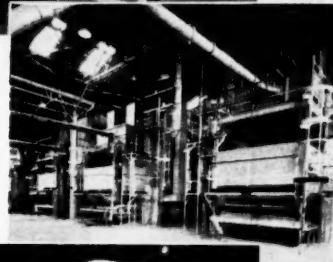
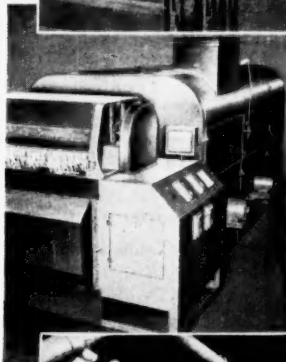
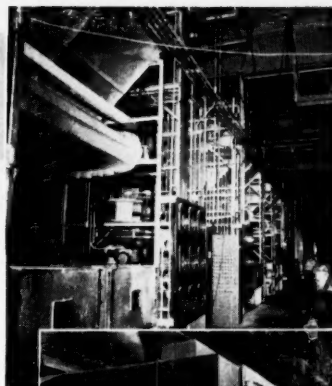
DRYERS (Conveyor, Tray, Truck, Rotary, Pole, Tunnel, Laboratory, Pilot Plant)  
COOLERS • FEEDERS • EXTRUDERS • GRANULATORS

### C. G. SARGENT'S SONS CORPORATION

Graniteville, SINCE 1852 Massachusetts

PHILADELPHIA • CINCINNATI • ATLANTA • CHARLOTTE • HOUSTON • CHICAGO • DETROIT • TORONTO

CHEMICAL ENGINEERING—November 16, 1959



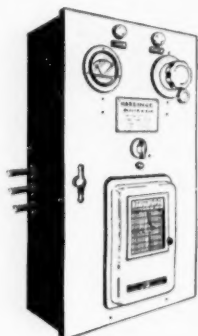
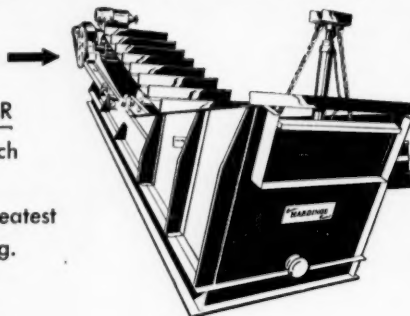
Sargent installations pictured above: Bank of 4 synthetic rubber dryers, 3-pass, gas-fired, at Good-year Tire and Rubber Company, Houston, Texas • Two-stage Kaolin dryer with Sargent double-hopper extruder, at American Industrial Clays, Sandersville, Ga. • Pilot plant dryer with extruder and cooling sections. Remarkably compact and efficient. At a well-known chemical company • Four Sargent dryers for England's first general purpose (bulk) synthetic rubber plant. Built under Sargent license — installed at International Synthetic Rubber Co., Ltd., Hythe, Southampton • Two-compartment truck dryer with controlled even heat distribution through all trucks, at a large chemical company.

# OPERATING MODELS...

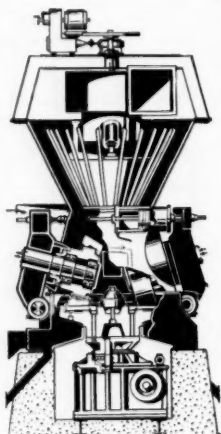
of equipment shown below, will be on display at the Hardinge Exhibit,

## BOOTH 582 AT THE CHEM SHOW

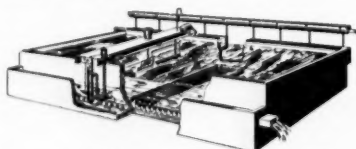
The completely new "OVERDRAIN" CLASSIFIER with up-wash action, which prevents slimes from re-mixing with sands for greatest efficiency in sand washing.



The new "ELECTRIC EAR"® grinding mill feed control with build-in sound recording chart, which keeps a continuous record of your mill operation around the clock, and increases your grinding output 10% to 20%.



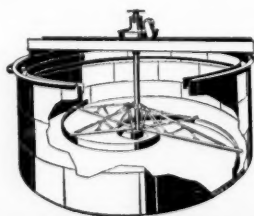
The new DISC-ROLL MILL with pneumatic grinding roll loading and "Gyrotor" Air Classifier which eliminates overloading and provides the widest possible flexibility in operation.



The well-known Hardinge AUTOMATIC BACKWASH SAND FILTER which, as its

name implies, cleans its own filter bed automatically without shut-down or "change-over."

The popular Hardinge "AUTO-RAISE" THICKENER which prevents scraper breakage due to overloads; automatically lifts scrapers upward in an emergency.



# HARDINGE

COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 ARCH ST. • Main Office and Works  
New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco • Birmingham • Jacksonville Beach

## SHOW DIRECTORY...

### STAIR STEPS, SAFETY

- \*Aluminum Co. of America.....559
- Blaw-Knox Co. ....581
- \*Norton Co. ....1289-1291

### STEEL GRATING AND FLOORING

- Blaw-Knox Co. ....581

### STERILIZERS

- American Sterilizer Co.....366
- Barnstead Still and Sterilizer Co. ....416
- Hospital Supply Co., Inc.....975
- Industrial Products Engineering Co. ....1259
- New York Laboratory Supply Co., Inc. ....1022
- Scientific Glass Apparatus Co., Inc. ....332
- Tenso-Lab., Inc. ....1123
- Wilmot Castle Co.....1033

### STILLS

- American Sterilizer Co.....366
- Barnstead Still and Sterilizer Co. ....416
- Chemical and Pharmaceutical Industry Co., Inc.....1064
- \*Consolidated Vacuum Corp.....1353
- Devine Mfg. Co., J. P. ....1372
- Distillation Engineering Co.....1048
- Glascote Products, Inc.....596
- Hospital Supply Co., Inc.....975
- Hunt Machine Co., Rodney.....1240-1242-1244
- Lee Metal Products Co., Inc.....1384
- Mazzoni, G., S. P. A.....1412
- New York Laboratory Supply Co., Inc. ....1022
- \*Pfandler Permutit, Inc.....110 & 141
- Precision Scientific Co.....370-372
- Seavy & Sons, M. J.....1071
- Star Tank & Filter Corp.....233
- \*Stokes Corp., F. J.....38 & 67
- Tenso-Lab., Inc. ....1123
- Wilmot Castle Co.....1033

### STRAINERS

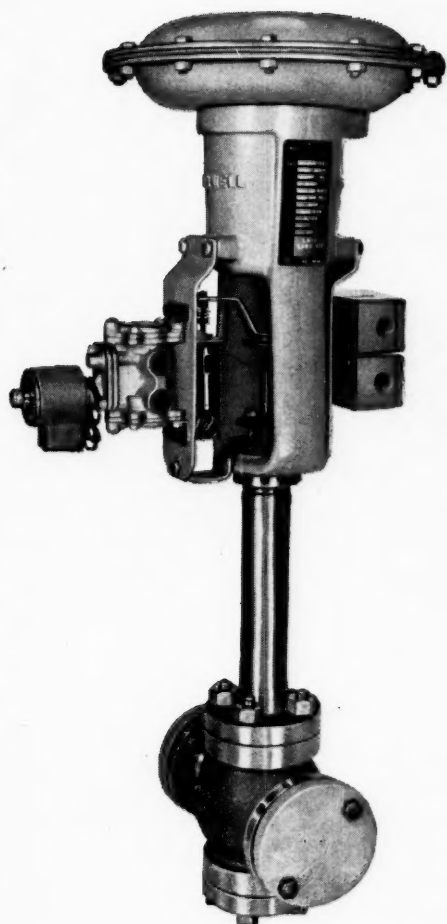
- \*Alloy Steel Products Co.....22
- Alsop Engineering Corp.....381
- American Plant Equipment Co. ....1282-1284
- Anderson Co., V. D., Div. of International Basic Economy Corp. ....1265
- Armstrong Machine Works.....1226
- Automatic Switch Co.....847
- \*Commercial Filters Corp.....223
- Corning Glass Works.....134
- \*Crane Co. ....422
- Croll-Reynolds Engineering Co., Inc. ....1054
- Dorr-Oliver Inc. ....531
- \*Fansteel Metallurgical Corp.....617
- Filterite Corp. ....1303
- Great Western Mfg. Co.....216
- Leslie Co. ....1333
- Monarch Mfg. Works, Inc.....881
- \*Multi-Metal Wire Cloth Co., Inc.....191
- \*Parks-Cramer Co. ....55
- \*Protectoseal Co. ....1286
- Rockwood Sprinkler Co., Div. of Gamewell Co. ....1238-1271-1273
- Sarco Co., Inc. ....93
- Schutte and Koerting Co.....61
- \*Strong, Carlisle & Hammond.....1121
- Terriss Div., Consolidated Siphon Supply Co., Inc. ....1329-1331
- Velan Steam Specialties, Inc.....1300
- \*Yarnall-Waring Co. ....49

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.

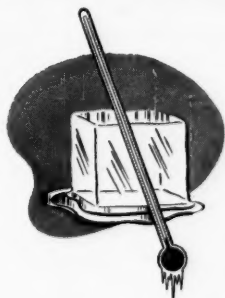


**is your**

# **PROCESS FLOW COLD?**



**Honeywell control valves are available  
for a wide range of temperatures**



Whether you're concerned with minus 450 or 1200°F, there's a Honeywell automatic control valve for your process flow. The Honeywell valve illustrated—Series 800, Type 12 single seated—is designed for liquid oxygen service. Thoroughly degreased and sealed, it includes such features as: bronze bush-

ings . . . stainless steel body and trim . . . seal-welded seat ring . . . low-temperature bolting . . . non-lubricated, Teflon-impregnated, blue asbestos packing . . . designed clearances for non-sticking, non-galling operation.

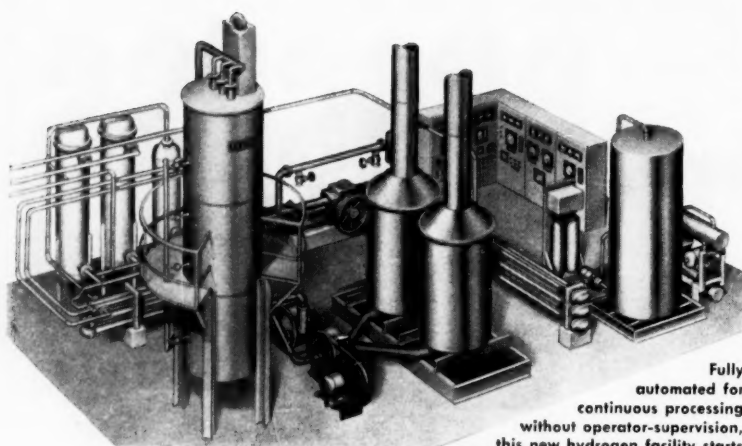
For hot or cold flows . . . or other process flow conditions . . . Honeywell valves are available in a wide range of types and sizes. When you need control valves . . . contact your local Honeywell field engineer. Write for new Catalog C800-1.

MINNEAPOLIS-HONEYWELL, Fort Washington, Pa.

## **Honeywell**



*First in Control*



Fully automated for continuous processing without operator-supervision, this new hydrogen facility starts with hydrocarbon gas feed.

## DO YOU USE HYDROGEN

... in Quantities of 1,000-10,000 CFH?

... with Purity of 99.5% Plus?

If you do, it will pay you to investigate the economic advantages of Selas' new system for producing up to 99.99% pure hydrogen at low bulk cost.

Based on installation at a West Virginia firm, for example, where hydrogen of only 99.5% purity is required, the Selas Hydrogen Generation and Purification Plant is capable of delivering the hydrogen at an operating cost of 8.6¢ per 100 SCF.

To determine what *your* operating costs would be for equivalent purity, refer to the following table, which lists utilities requirements per 100 SCF of hydrogen produced:

UTILITY	AMOUNT	YOUR RATE	YOUR COST
Natural Gas	80 SCFH	.....	.....
Steam	16 lb/hr	.....	.....
Water (cooling)	270 gph	.....	.....
Power	1.4 KWH	.....	.....

YOUR TOTAL OPERATING COST PER 100 SCF \_\_\_\_\_

*If you would like more information, fill-in and mail coupon*

## SELAS CORPORATION OF AMERICA

DRESHER, PENNSYLVANIA

### HEAT AND FLUID PROCESSING ENGINEERS

Mr. M. Kitzen, Fluid Processing Div.  
Selas Corporation of America  
Dresher 4, Pa.

Please send me more information about the Selas Hydrogen Generation and Purification Plant. My requirements would be about \_\_\_\_\_ CFH. My application of hydrogen is \_\_\_\_\_

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_

## SHOW DIRECTORY . . .

### SWITCHES

Automatic Switch Co.	847
Magnetrol, Inc.	910-912
Syntron Co.	163
*Thermo Electric Co., Inc.	817
*Westinghouse Electric Corp.	510

### TACHOMETERS

Scientific Glass Apparatus Co., Inc.	332
Sticht Co., Inc., Herman H.	1280

### TANKS

Alloy Products Corp.	1205
Alsop Engineering Corp.	381
*Aluminum Co. of America	559
*American Meter Co., Inc., Pump Div.	150
Artisan Metal Products	874
Beckley, Haltom & Hickman	1342-1363
Bel-Art Products	889
Blickman, Inc., S.	325
Chemicolloid Laboratories, Inc.	618
Cherry-Burrell Corp.	1039-1045-1049
Chicago Bridge & Iron Co.	844
Colonial Plastics Mfg. Co.	1283
Colton Co., Arthur Div., Snyder Corp.	50
Day Co.	45
Delaware Barrel & Drum Co., Inc.	1187-1189-1193
Denver Equipment Co.	1146
*Devine Mfg. Co., J. P.	1372
Downingtown Iron Works, Inc., Div. of Pressed Steel Tank Co.	631
Duriron Co., Inc.	520 & 532
Ertel Engineering Corp.	623
Galigher Co.	843
General Alloys Co.	193
*General American Transportation Corp.	435-436-442-446-495
General Ceramics Corp.	131
Gifford-Wood Co.	219
Glascote Products, Inc.	596
*Haveg Industries, Inc.	546
Heil Process Equipment Corp.	1305
Hockmeyer & Co., Herman	1178
Industrial Plastic Fabricators, Inc.	1102
International Process Equipment Co., Inc.	812
Knapp Mills Inc.	175
Knight Co., Maurice A.	586
Koven Fabricators, Inc.	74
Lead Industries Assn.	816
Lead Lined Iron Pipe Co.	70
Lee Metal Products Co., Inc.	1384
McIntosh Equipment Corp.	1343-45-47-49-51-53
*Metal Cladding, Inc.	1378
Nalge Co., Inc.	1201
Norcross Companies, Sterling E.	991
*Patterson Foundry & Machine Co.	154
*Pfaudler Permutit, Inc.	110 & 141
Posey Iron Works, Inc.	1407
Pressed Steel Tank Co.	631
*Protectoseal Co.	1286
Southwestern Engineering Co.	1250-1252
Stainless Products Corp.	1158
Standard Steel Corp.	153
Swepeco Tube Corp.	834
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Thermon Mfg. Co.	1207
U. S. Mixers Div., Stockdale Engineering Co.	1237
*U. S. Stoneware Co.	111
Wilmot Castle Co.	1033

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



## TWO Fisted Performance



In pumping chemicals, maximum service satisfaction is dependent on *two* factors. Design and construction quality constitute one factor; the other is the accuracy of the foundry in meeting metallurgical specifications for corrosion resistance.

Because LaBour pumps embody such important and exclusive features of design it is perhaps easy to overlook the fact that LaBour foundries employ equipment and techniques second to none for precise control of alloy composition and grain structure.

That's why, when you buy LaBour, you get *two*-fisted performance assurance. Top ability to resist corrosion *and* top ability to move liquids economically and dependably are combined in these pumps. Ask for Bulletin B-1b.

### REGULAR PRODUCTION IN LaBOUR FOUNDRIES INCLUDES THESE ALLOYS:

- Electric Furnace Cast Iron
- Bronze
- Lead
- Aluminum
- R-55 (Chrome-Nickel)
- Y-17 (Chrome-Nickel-Molybdenum)
- Y-30 (Nickel-Molybdenum)
- 149 Stainless Steel
- 304 Stainless Steel
- 316 Stainless Steel
- Elcomet K (High Nickel Stainless)

ORIGINAL MANUFACTURERS OF THE SELF PRIMING CENTRIFUGAL PUMP

# LABOUR

THE LaBOUR COMPANY, INC. • ELKHART, INDIANA, U. S. A.



**a direct  
approach**



**to your  
filtration problem**

Sperry Filter Presses can be made with new glass-reinforced Polyester plates and frames.

Visit Our Booth 1362  
At the 11th National  
Chemical Exposition

A filtration problem that's unique to you ... is probably "old hat" to Sperry.

Through 90 years of filtration leadership, Sperry has solved thousands of filtration problems for hundreds of industries—continually applying new ideas—new techniques—and new engineering know-how to produce *flexible, superior filtration at low cost!*

Sperry makes this priceless experience available to all industries—everywhere! To introduce it to your plant, simply write for a copy of Sperry's comprehensive filtration catalog. It's yours, without cost or obligation.

# SPERRY

**FILTER PRESSES · FILTER MEDIA · CLOSING DEVICES · PLATE SHIFTERS**

## FREE SPERRY CATALOG

The outstanding performance of low-cost Sperry Filtration merits your further investigation. Write today for your free copy of the complete Sperry Catalog, including detailed information of Sperry's Plate-Shifters, Closing Devices and other Labor-Saving Accessories.

## D. R. SPERRY & CO. BATAVIA, ILLINOIS

### Sales Representatives

George S. Tarbox  
808 Nepperhan Ave., Yonkers, N. Y.  
B. M. Pihashy  
833 Merchants Ex. Bldg., San Francisco, Cal.  
Aldredge & McCabe  
847 E. 17th Ave., Denver, Colorado  
Texas Chemical Eng. Co.  
4101 San Jacinto, Houston, Texas

D. R. SPERRY & CO.  
CE-11-3  
Batavia, Illinois

- ☐ Send Free Sperry Catalog  
☐ Have your Representative Contact us

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Visit our Booth 1362 at the  
11th National Chemical Exposition



## SHOW DIRECTORY . . .

Yuba Consolidated Industries,  
Inc. . . . . 882-884-886

## THERMOMETERS

American Instrument Co., Inc.	445
*Bailey Meter Co.	46
*Barber-Colman Co. Wheelco Instruments Div.	395
Brabender Instruments, Inc., C. W.	340
Chemical and Pharmaceutical Industry Co., Inc.	1064
Edison Industries, T. A., Instrument Div. McGraw-Edison Co.	945
General Laboratory Supply Co.	310
New York Laboratory Supply Co., Inc.	1022
Radiation Electronics Co., Div. Comptometer Corp.	1155-1157
*Rochester Mfg. Co., Inc.	943
*Sarco Co., Inc.	93
Scientific Glass Apparatus Co., Inc.	332
Taylor Instrument Companies	104
Tenso-Lab., Inc.	1123
Trerice Co., H. O.	1287
Welch Mfg. Co., W. M.	205

## THICKENING AND DEWATERING MACHINERY

American Tool & Machine Co.	862
Baker Perkins, Inc.	560 & 609
Carver, Inc., Fred S.	90
*Davenport Machine & Foundry Co.	818
De Laval Separator Co.	94
Denver Equipment Co.	1146
Dorr-Oliver Inc.	531
Eimco Corp.	80
*Hardinge Co., Inc.	582
Industrial Products Engineering Co.	1259
*Kohlmeier-Sanderson Engineering Corp.	1307-1309
North-Erie & American Process Equipment Div. National-U. S. Radiator Corp.	850
No Vo Div., Industrial Enterprises, Inc.	1030
*Premier Mill Corp.	1391
RKL Controls, Inc.	1405
Renneburg & Sons Co., Edw.	1078
*Shriver & Co., Inc., T.	473
Southwestern Engineering Co.	1250-1252
*Tolhurst Centrifugals Div., American Machine & Metals, Inc.	506

## TOOLS

Airetool Mfg. Co.	841
Ampco Metal, Inc.	412
Imperial Brass Mfg. Co.	894-896
Ingersoll-Rand Co.	128
Marindus Co., Inc.	1440
Parker Fittings & Hose Div., Parker-Hannifin Corp.	431
*Rockwell Mfg. Co.	69
Victaulic Co., of America	1192-1190

## TOWER PACKING OR FILLING

*Aluminum Co. of America	559
*Duriron Co., Inc.	520 & 532
Ethylene Corp.	971
General Ceramics Corp.	131
*Havag Industries, Inc.	546
Knight Co., Maurice A.	586

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



An exclusive\*  
TRANTER  
advancement  
in heat transfer  
technology



# NEW MULTI-ZONE PLATECOIL®

\*PATENTS APPLIED FOR

## Cuts start-up time, keeps tank temperatures constant

### New FLOW PATTERN for more even distribution

Multiple headers and multiple returns provide for FREE-FLO action — with practically instantaneous distribution of steam to all levels of the plate. Condensate "trapping" is held to a minimum. This gives the new MULTI-ZONE PLATECOIL a reserve capacity to deliver under overload conditions during "start-up." It also produces extremely fast recovery of tank temperature with minimum variation.



Write for NEW PLATECOIL BULLETIN  
P61 FOR COMPLETE SPECIFICATIONS  
AND DATA.



**Tranter Manufacturing Inc.**

LANSING 9, MICHIGAN

### Operating pressures up to 250 psi

Higher pressure containment is achieved through the use of DURAWELD bonding of the plates and mill-controlled TRANSTEEL in standard MULTI-ZONE PLATECOIL units. This makes it possible to apply the time-proven advantages of PLATECOIL to many types of heating where 250 pound steam is required. Destruction tests have demonstrated a safety factor of more than 5 to 1.

### Save on Installation and Maintenance

PLATECOIL costs are low compared to the cost of engineering, fabricating, installing and maintaining pipe coils. PLATECOIL units are lightweight for easy handling. They give more heat transfer per unit of surface. Compact PLATECOIL saves valuable tank space. Deposits do not build as readily on streamlined surfaces as they do on pipe coils. PLATECOIL is also relatively simple and economical to clean. With PLATECOIL, there need be no threaded joints below the liquid level to corrode or leak.

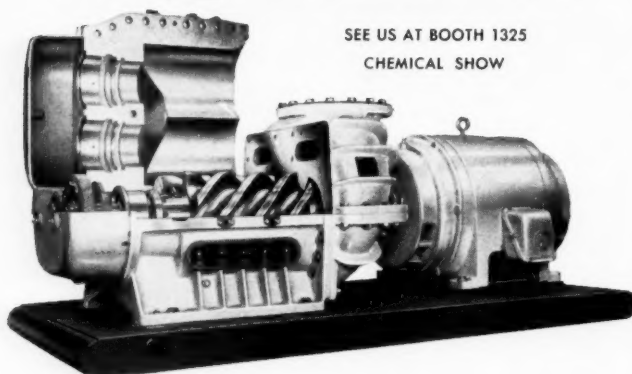
CUT COSTS ON ALL TYPES OF TANK AND PROCESS HEATING AND COOLING APPLICATIONS WITH MULTI-ZONE PLATECOIL.

SEE US AT THE CHEMICAL EXPOSITION BOOTHS 1206-1208-1210

**PLATECOIL®**  
DIVISION

You'll find this is

# the only rotary compressor with all these features!



Fairbanks-Morse Positive Displacement Axial-Flow Rotary Compressors are available in standard models in single-stage units, with capacities from 800 to 12,500 cfm. at compression ratios from 1.6:1 to 5.0:1—or in two-stage units with capacities from 2,000 to 12,500 cfm. at compression ratios above 5.0:1—and for booster service at maximum working pressures up to 250 psig.

- **High efficiency and stability** that rivals reciprocating machines.
- **Low weight and small space** requirement that cuts costs for installation, foundation and building.
- **Oil-free output**—no metal-to-metal contact of impellers or casing, no lubrication of parts contacting gas, air or vapor.
- **Mechanical simplicity**—no valves, no pistons or reciprocating parts to wear or replace.
- **Adaptability to any power source** permits choice of induction or synchronous motor, diesel engine, gas or steam turbine as prime mover.
- **Smooth, steady operation**—impeller speed and design produce even delivery of flow with minimum pulsation or vibration.

For complete information contact your nearby Fairbanks-Morse Branch, or write Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill. Ask for new Bulletin ACO 100.2.



## FAIRBANKS-MORSE

a name worth remembering when you want the BEST

COMPRESSORS • PUMPS • SCALES • DIESEL, DUAL FUEL AND GAS ENGINES  
LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS • MAGNETOS • HOME WATER SYSTEMS

### SHOW DIRECTORY . . .

\*National Carbon Co. ....460-470  
Packed Column Corp. ....1171  
Porter Inc. George K. ....1134-1136  
Scientific Development Co. ....382  
\*U. S. Stoneware Co. ....111

### TOWERS

Blickman, Inc., S. ....325  
Distillation Engineering Co. ....1048  
Downingtown Iron Works, Inc.,  
Div. of Pressed Steel Tank Co. 631  
Duriron Co., Inc. ....520 & 532  
Falls Industries, Inc. ....131  
Fibercast Co. Div., Youngstown  
Sheet & Tube Co. ....870  
\*General American Transportation  
Corp. ....435436-442-446-495  
General Ceramics Corp. ....131  
\*Haveg Industries, Inc. ....546  
Heil Process Equipment Corp. 1305  
Knapp Mills Inc. ....175  
Knight Co., Maurice A. ....586  
\*Koven Fabricators, Inc. ....74  
Metal Cladding, Inc. ....1378  
\*National Carbon Co. ....460-470  
\*Pfaudler Permutit, Inc. ....110 & 141  
Porter Inc., George K. ....1134-1136  
Pressed Steel Tank Co. ....631  
\*U. S. Stoneware Co. ....111  
Yuba Consolidated Industries,  
Inc. ....882-884-886

### TRANSMISSION EQUIPMENT

\*Allis-Chalmers Mfg. Co. ....636  
Bartlett & Snow Co., C. A. ....569  
\*Brooks Rotameter Co. ....998  
Chain Belt Co. ....1416  
\*Jeffrey Mfg. Co. ....97  
Link-Belt Co. ....165  
Minneapolis-Honeywell Regula-  
tor Co. ....635  
\*Philadelphia Gear Works, Inc. ....123  
U. S. Electrical Motors, Inc. ....837  
Worthington Corp. ....545

### TRAPS, STEAM

American Air Filter Co., Inc. ....676  
Anderson Co., V. D., Div. of In-  
ternational Basic Economy  
Corp. ....1265  
\*Armstrong Machine Works. ....1226  
\*Crane Co. ....422  
Grinnell Co., Inc. ....566  
Peerless Mfg. Co. ....1008  
\*Sarco Co., Inc. ....93  
Scientific Glass Apparatus Co.,  
Inc. ....332  
\*Strong, Carlisle & Hammond. ....1121  
Trefice Co., H. O. ....1287  
Velan Steam Specialties, Inc. ....1300  
\*Yarnall-Waring Co. ....49

### TUBE EXPANDERS

Airetool Mfg. Co. ....841

### TUBES

\*Aluminum Company of America. 559  
Ampeco Metal, Inc. ....412  
B-I-F Industries, Inc. ....660  
\*Babcock & Wilcox Co., Tubular  
Products Div. ....1002-1004-1006  
Dore' Co., John L. ....1295-1297  
Ethylene Corp. ....971  
Filtros Inc. ....854-856  
\*Haveg Industries, Inc. ....546  
International Nickel Co., Inc. ....509  
Norton Co. ....1289-1291  
\*Republic Steel Corp. ....68

\*For additional information see advertise-  
ment in this issue and use your Reader Service  
postcard, p. 247.

# Tune up furnaces with dashboard simplicity Using a Bailey HEAT PROVER Analyzer



• For fast accurate combustion analysis, compare this portable unit to Orsat measurements: It tells you **what's happening** as you make furnace, kiln, or engine adjustments, **not what happened!** No guessing, no spot readings to average. Simple, convenient to use.

The continuous readings from a Bailey HEAT PROVER Analyzer enable operators to correct combustion variables before costly losses are incurred. The two meters on the analyzer show per cent by volume of oxygen and combustibles on either a 20% range span or a more sensitive 4% range. Temperature of the gases in degrees Fahrenheit may also be shown.

To order or get additional facts, write us direct or contact any of our District Offices. You'll find them listed in Chemical Engineering Catalog, Refinery Catalog, Thomas Register, or Mechanical Catalog.

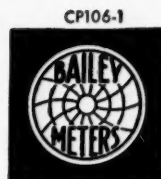
Gas analysis with Bailey HEAT PROVER Analyzer at a process heater. Per cent oxygen and combustibles is shown continuously while testing.

*Chemical and petroleum division*  
**BAILEY METER COMPANY**

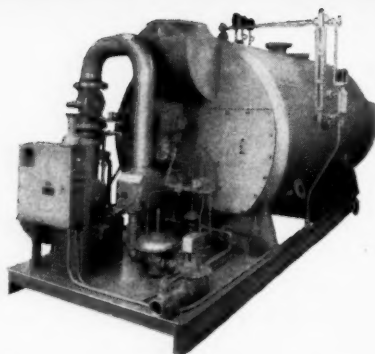
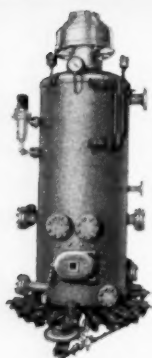
1054 IVANHOE ROAD • CLEVELAND 10, OHIO

in Canada—Bailey Meter Company Limited, Montreal

VISIT BAILEY METER BOOTH NO. 46 AT THE CHEMICAL SHOW



## Lower Processing Costs with Eclipse Vaporizers and Liquid Phase Heaters for Dowtherm\*



Vertical units rated to 2 million Btu, and horizontal to 6 million Btu.  
Vaporizers shown are typical of complete Eclipse line.

Eclipse fire-tube vaporizers and liquid phase heaters provide lower processing costs on high-temperature applications because of these factors:

1. Low operating pressures reduce equipment costs — for example, 95 psig for 700° F.
2. Up to 1/3 lower insurance rates.
3. Elimination of fire hazards involved in direct-fired process heating.
4. Precise temperature control eliminates overheating or underheating in critical processes.
5. Compact installation requires minimum floor space.
6. Directed flow, natural circulation that scrubs heating surfaces vigorously for faster heat transfer, no violent boiling of liquid, and no build-up of scale on heat exchange surfaces.

For more data on Eclipse Vaporizers and liquid phase heaters, write for Bulletin A-100 describing the complete line available and showing typical installations.

\* Write for information on equipment for use with other heat transfer media.

VISIT ECLIPSE BOOTH NO. 973—Chemical Industries  
Exposition, New York, November 30—December 4



**ECLIPSE FUEL ENGINEERING CO.**  
1121 Buchanan Street, Rockford, Illinois

Export Ad. Auriemo, Inc., 85 Broad St., New York 4, N. Y.

### SHOW DIRECTORY . . .

Union Steel Corp. ....	840
*Westinghouse Electric Corp. ....	510
Welch Mfg. Co., W. M. ....	205
Yuba Consolidated Industries, Inc. ....	882-884-886

### TUBING

*Allied Chemical Corp. ....	955-957-959-961
*Aluminum Co. of America. ....	559
Ampco Metal, Inc. ....	412
Autoclave Engineers ....	346
Bel-Art Products ....	889
Bishop & Co., Platinum Works J. ....	900-902
Carpenter Steel Co., Alloy Tube Div. ....	675
Cherry-Burrell Corp. ....	1039-1045-1049
Colonial Plastics Mfg. Co. ....	1283
*Corning Glass Works. ....	134
Crucible Steel Co. of America. ....	1424-1426-1428
Curtiss-Wright Corp., Metals Processing Div. ....	1344-1346
Dore' Co., John L. ....	1295-1297
Drayer Hanson Div., National-U. S. Radiator Corp. ....	850
Ethylene Corp. ....	971
*Fansteel Metallurgical Corp. ....	617
Fibercast Co., Div., of Youngstown Sheet & Tube Co. ....	870
*Garlock Packing Co. ....	415
*Havag Industries, Inc. ....	546
Heat Transfer Div., National-U. S. Radiator Corp. ....	850
High Pressure Equipment Co., Inc. ....	1215-1217
Imperial Brass Mfg. Co. ....	894-896
International Nickel Co., Inc. ....	509
Keasbey & Mattison Co. ....	822
Knapp Mills Inc. ....	175
Ladish Co. ....	63
Lead Industries Assn. ....	816
Miller Products Co., Inc. ....	1091
Moore & Co., Samuel, Dekoron Products Div. ....	1182-1184
Nalge Co., Inc., The. ....	1201
National-U. S. Radiator Corp. ....	850
Pennsylvania Fluorocarbon Co., Inc. ....	969
Porter Inc., George K. ....	1134-1136
*Raybestos-Manhattan, Inc. ....	820
*Republic Steel Corp. ....	68
*Resistoflex Corp. ....	893-895-897
*Saran Lined Pipe Co. ....	913
Schutte & Koerting Co. ....	61
Scientific Glass Apparatus Co., Inc. ....	332
*Sigmamotor, Inc. ....	1099
Superior Tube Co. ....	1200
Sweeco Tube Corp. ....	834
Union Steel Corp. ....	840
*U. S. Stoneware Co. ....	111
Welch Mfg. Co., W. M. ....	205

### TURBINES

*Allis-Chalmers Mfg. Co. ....	636
Cleveland Mixer Co. ....	1067-1069
Gifford-Wood Co. ....	219
Pressure Products Industries, Inc. ....	1367-1369
Westinghouse Electric Corp. ....	510

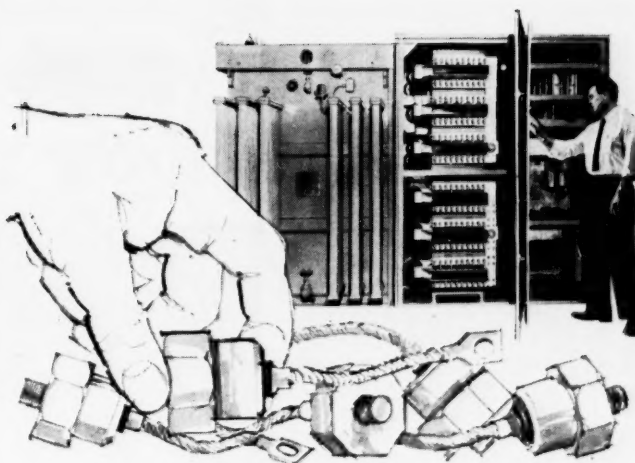
### ULTRA VIOLET LAMPS

Chemical & Pharmaceutical Industry Co., Inc. ....	1064
Engelhard Industries, Inc. ....	192-196
Scientific Glass Apparatus Co., Inc. ....	332

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



# EFFICIENCY IN A SEMICONDUCTOR RECTIFIER



The I-T-E UNITRON Semiconductor Rectifier

Today, in the electrochemical industry, the economy of the semiconductor rectifier as a source of d-c is scarcely disputed. Certain differences in efficiency, however, can produce significant differences in the ultimate economy which the user may enjoy. For example, the I-T-E UNITRON semiconductor rectifier incorporates unique design details which aim specifically to boost efficiency.

**Voltage equalization**—Variations in inverse resistance of semiconductor cells are normal. When cells are used in series, some method of inverse voltage equalization is required to prevent overworking of certain cells. Many seemingly obvious methods, such as using resistors or connecting complete rectifiers in series, etc., are uneconomical as regards both operating cost and space. For the UNITRON, I-T-E engineered a special circuit in which a small auxiliary transformer is used to maintain an equal inverse-voltage on all series cells without taking current from the system. This transformer, in fact, consumes no power. It needs no maintenance. And it makes possible the instant detection of cell failures for timely replacement before an entire series of cells fails.

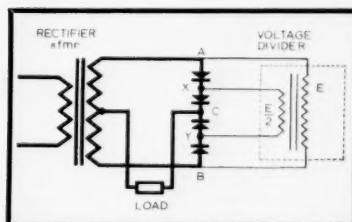
**Current equalization**—Parallel connected cells will normally divide the total forward current unequally because of differences in forward resistance. Therefore cells with the lowest forward drop will carry a disproportionately higher share of the total current. But the UNITRON's unique current equalizer insures that all parallel cells will carry equal current, regardless of normal variations in forward resistance. The design is of the utmost simplicity, consisting entirely of iron laminations through which conductors from the parallel cells pass. There is nothing to fail or need service during the life of the rectifier. The action of this compact cur-

rent equalizer materially extends cell life and keeps cell maintenance cost and downtime to a minimum.

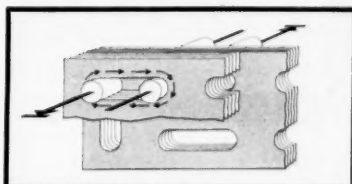
**Random cell selection**—The combination of forced voltage equalization for series cells and forced current equalization for parallel cells gives the I-T-E UNITRON virtual freedom from the effects of normal variations in cell resistance. Users may select cells at random for any position. This eliminates the nuisance—and the expense—of coding cells for various positions. Yet at the same time you have greater assurance of long cell life, because the overloading of individual cells is eliminated.

**Water cooling**—Just in the cooling system alone, the I-T-E UNITRON saves money over other rectifiers. First, it costs so little to operate. Second, it takes little space. Third, it prolongs average cell life. It uses ordinary tap water . . . no coolant is more efficient than water or costs less. A purification system continually removes contaminants and free ions to protect the system from corrosion and prevent electrical leakage. Since it is a closed loop system, it cools each cell to the same temperature . . . eliminating hot cells and premature failures. And it permits the changing of cells without disturbing the cooling system. This unique I-T-E UNITRON cooling system eliminates the need for power-eating blowers and space-eating ducts. Also it saves the cost of special coolants and spares personnel from the risk of skin irritation.

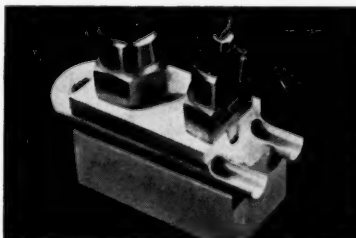
All these design features of the I-T-E UNITRON add up to higher operating efficiency and lower operating cost. The UNITRON is available in any desired d-c voltage and current rating. It can be used in parallel with any other type of conversion equipment. Discover how you can benefit from these advantages. Write I-T-E Circuit Breaker Company, Transformer & Rectifier Division, 1900 Hamilton Street, Philadelphia 30, Pa.



**Simplified schematic of voltage equalizer.** When side A is conducting, voltage between C and B is equal to that between A and B (neglecting the small drop through the cells). The voltage divider secondary applies a voltage between C and Y which is half that between C and B. This divides the inverse voltage between the two non-conducting cells evenly.



**The current equalizer.** Adjacent conductors carrying current in opposite directions pass through overlapping windows in two sections of iron laminations. Transformer effect of laminations effectively equalizes currents between neighboring conductors.



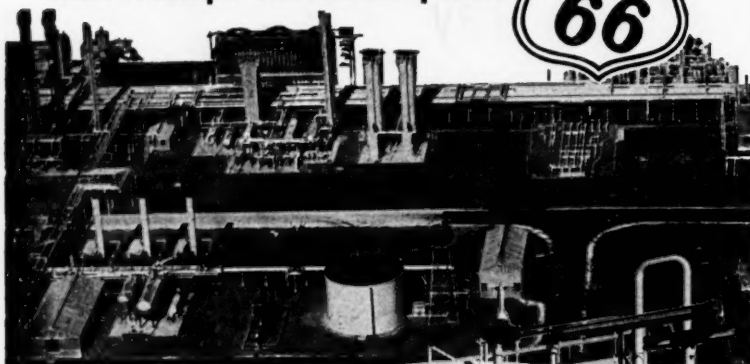
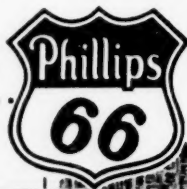
**Section of bus bar . . .** showing how cooling water flows close to cells for efficient cooling. Bus bar can be as long as necessary to hold the number of required cells. No need to drain system to change cells.

Visit the I-T-E display in booth 25 at the 27th Exposition of Chemical Industries

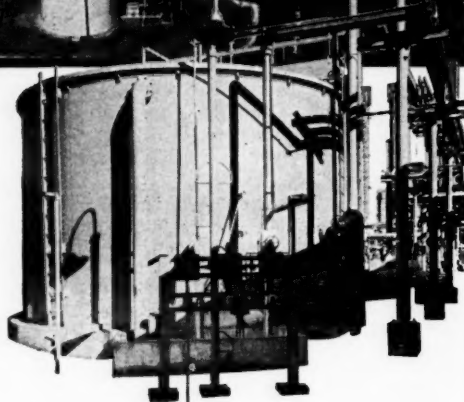


## I-T-E CIRCUIT BREAKER COMPANY

This Phillips Petroleum plant..



uses this  
solids  
contact  
reactor  
shell...



*built by* **BOARDMAN**

If your company needs precision-built metal products, you can put Boardman's metalcrafting skill to profitable use. The carbon steel reactor shell above, built to the specifications of the Cochrane Corporation for Phillips Petroleum's Andrews, Texas, gasoline plant, is another example of "Boardmanability."

Boardman's long experience in working with metals—carbon, high-tensile and stainless steels, wrought iron, aluminum and others—can make metal work for you. And Boardman can assist you in design and engineering, as well as in specialized fabrication. Call Boardman collect, for consultation or for quotes on your next chemical process project.

**BOARDMAN**  
**THE BOARDMAN CO.**  
OKLAHOMA CITY, OKLAHOMA

Write for the brochure "Working with metal... at Boardman"

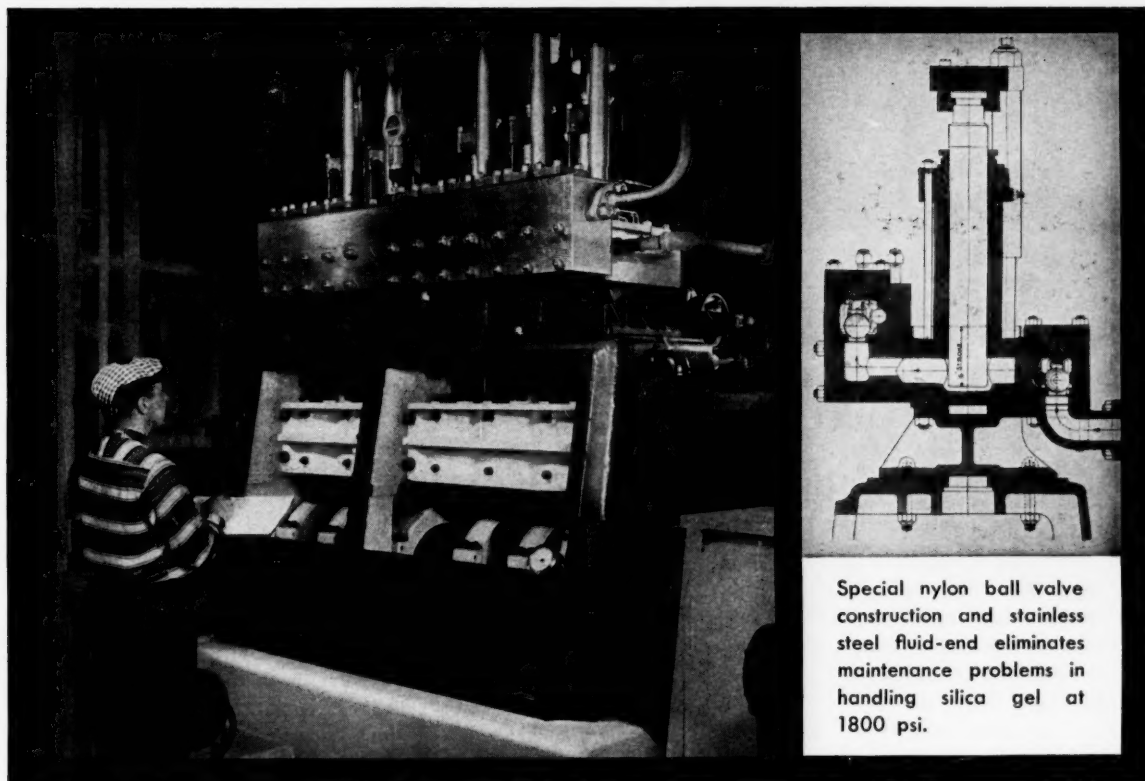
## SHOW DIRECTORY . . .

### VALVES AND FITTINGS

A.P.V. Company, Inc.	1302
Alloy Products Corp.	1205
*Alloy Steel Products Co.	22
American Instrument Co., Inc.	445
Appareils Gachot	1095
Autoclave Engineers	346
Automatic Switch Co.	847
Automotive Rubber Co., Inc.	802
B-I-F Industries, Inc.	660
Beckley, Haltem & Hickman	1342-1363
*Black, Sivalls & Bryson, Inc.	669
Brown & Co., J. G.	1093
Cameron Iron Works, Inc.	1062
Carlisle Gas Burner Corp.	1251
Chem Flow Corp.	1227
Chemiquip Co.	888
Cherry-Burrell Corp.	1039-1045-1049
*Chiksan Co., Subsidiary of Food Machinery & Chemical Corp.	1268-1270
Cleveland Mixer Co.	1067-1069
Colonial Plastics Mfg. Co.	1283
*Consolidated Vacuum Corp.	1353
Continental Mfg. Co.	876
*Cooper Alloy Corp.	103
*Corning Glass Works	134
*Crane Co.	422
*Devine Mfg. Co., J. P.	1372
DeZurik Corp.	907
*Duriron Co., Inc.	520 & 532
Dustex Corp.	1299-1301
*Eclipse Fuel Engineering Co.	973
*Eco Engineering Co.	978
Ever-Tite Coupling Co., Inc.	1159
Falls Industries, Inc.	131
*Frick Co.	1258-1260
*Fulton Sylphon Div., Robertshaw-Fulton Controls Co.	1293
Galigher Co.	843
General Kinetics Corp.	1370
Glascote Products, Inc.	596
*Grinnell Co., Inc.	566
*Haveg Industries, Inc.	546
High Pressure Equipment Co., Inc.	1215-1217
*Hills-McGanna Co.	1173-1174-1175-1176
*Hoke, Inc.	201
Imperial Brass Mfg. Co.	894-896
Industrial Plastic Fabricators, Inc.	1102
International Nickel Co., Inc.	509
*Jamesbury Corp.	1068-1070
*Jenkins Bros.	409
*Jerguson Gage & Valve Co.	1211-1213
Knapp Mills Inc.	175
*Knight Co., Maurice A.	586
Laboratory Furniture Co.	309
Ladish Co.	63
Ladish Co., Tri-Clover Div.	63
*Lapp Insulator Co., Inc.	696
Lead Industries Assn.	816
Lead Lined Iron Pipe Co.	70
Lunkenheimer Co.	1380-1382
Mission Mfg. Co.	1417-1419
Nalge Co., Inc.	1201
Okadee Co.	1386
Pacific Valves, Inc.	1315-1317
*Parks-Cramer Co.	55
*Pfaudler Permutit, Inc.	110 & 141
*Philadelphia Gear Works, Inc.	123
Porter Inc., George K.	1134-1136
*Powell Co., Wm.	133
Pressure Products Industries, Inc.	1367-1369
Putnam Co., Inc., J. L.	1040-1042
RKL Controls, Inc.	1405
Research Controls	1186
*Rockwell Mfg. Co.	69
Rockwood Sprinkler Co., Div. of Gamewell Co.	1238-1271-1272-1273
*Saran Lined Pipe Co.	913

AT DAVISON CHEMICAL LTD.

## Aldrich pumps tame highly abrasive, corrosive slurry in high pressure spray drying operation



Special nylon ball valve construction and stainless steel fluid-end eliminates maintenance problems in handling silica gel at 1800 psi.

When Davison Chemical Ltd. built its new plant in Valleyfield, Quebec, for the production of petroleum catalysts, a major problem was to find a pump that (1) had the abrasion and corrosion resistance to stand up in a continuous high pressure process without downtime or excessive maintenance and (2) could maintain the steady pumping pressures necessary to control particle size, density and porosity of the spray dried product.

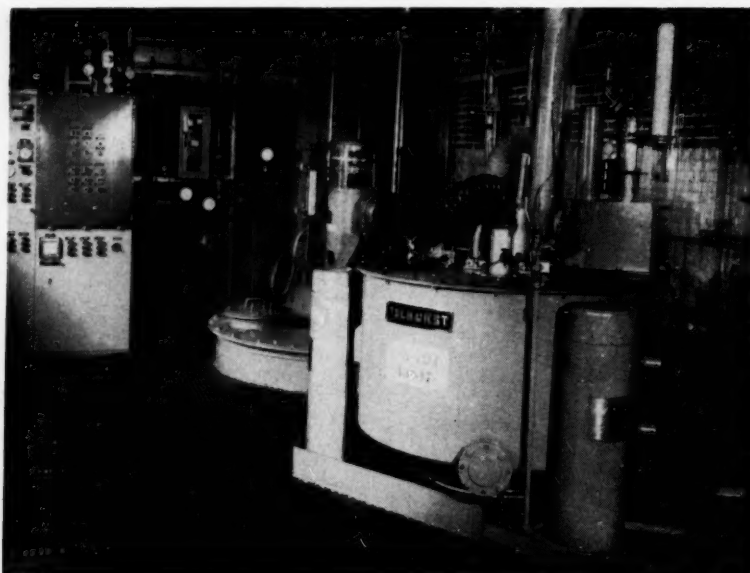
**What was done:** Davison Chemical engineers called on Aldrich for help and the result was the special valve design shown. After two years of continuous operation, the Aldrich pumps continue to deliver constant pressure without major overhaul. The General Manager of the plant reports: "We are quite pleased with the performance of these pumps."

**How Aldrich can help you:** Solving special pumping prob-

lems for the chemical industry is the most important work we do. We would welcome the opportunity to discuss your specific problems . . . no matter what the liquid or slurry, or how high the pressures. Standard Aldrich Pumps range from 25 to 2500 hp. Pressures to 30,000 psi. See our insert in Chemical Engineering Catalog for condensed data. Aldrich Pump Company, 3 Gordon Street, Allentown, Pennsylvania.

***the toughest pumping problems go to***





## BATCH-O-MATIC® provides high efficiency and constant quality control at MERCK & CO., INC.

This completely automated Tolhurst BATCH-O-MATIC meets this user's requirements for a dual-purpose extractor.

In the first application, excellent recovery of filtrate is obtained and solids are discarded.

In the second application, extremely high purity standards are maintained for solids which are saved. Here, filtrate is discarded.

BATCH-O-MATIC operation reduces exposure time and, therefore, maintains product stability.

Automatic operation, no crystal degradation during unloading, stepless variable basket speed, trouble-free performance and low operating costs helped determine the selection of a BATCH-O-MATIC. For more complete data, see Tolhurst's section in Chemical Engineering Catalog or write. Address Dept. A, East Moline, Illinois.

SEE US AT BOOTHS NO. 456, 506 AND 556  
DURING 1959 CHEMICAL SHOW

# Tolhurst® CENTRIFUGALS

A DIVISION OF

## American Machine and Metals, Inc.

Specialists in liquid-solids separation

EAST MOLINE, ILLINOIS

### SHOW DIRECTORY . . .

Schutte and Koerting Co.	61
Sellers Injector Corp.	1376
Stainless Products Corp.	1158
Star Tank & Filter Corp.	233
*Strahman Valves, Inc.	815
*Strong, Carlisle & Hammond	1121
*Taylor Instrument Companies	104
Terriss Div., Consolidated Siphon Supply Co., Inc.	1329-1331
Thermon Mfg. Co.	1207
Trerice Co., H. O.	1287
Tube-Turns Plastics, Inc.	96
*U. S. Stoneware Co.	111
Velan Steam Specialties, Inc.	1300
*Vogt Machine Co., Henry	124
Voss Co., Inc., J. H. H.	1224
*W-K-M Div., of ACF Industries, Inc.	941
Walworth Co.	26
*Waukesha Foundry Co.	1387-1389
Worcester Valve Co., Inc.	1163-1165

### VENTILATING APPARATUS

American Air Filter Co., Inc.	676
*Barnebey-Cheney Co.	52
Bartlett & Snow Co., C. O.	569
De Bothezat Fans Div., American Machine & Metals, Inc.	556
*Du Verre, Inc.	891
Filtros Incorporated	854-856
Heil Process Equipment Corp.	1305
*Protectoseal Co.	1286
Schutte and Koerting Co.	61
Wheelabrator Corp.	190

### VIBRATORS

*Carrier Conveyor Corp.	127
Cleveland Vibrator Co.	993-995
Eriez Mfg. Co.	909-911
Industrial Products Engineering Co.	1259
Martin Engineering Co.	1118
No Vo Div., Industrial Enterprises, Inc.	1030
Southwestern Engineering Co.	1250-1252
Syntron Co.	163
Tyler Co., W. S.	574
Vibra Screw Feeders, Inc.	1138-1142
Vibro Plus Products, Inc.	1393

### VISCOSIMETERS

American Instrument Co., Inc.	445
Brabender Corp.	37
Brabender Instruments, Inc., C. W.	340
Brinkmann & Co., Inc., C. A.	360
Brookfield Engineering Laboratories, Inc.	885-887
Ferrenti Electric, Inc.	1144
New York Laboratory Supply Co., Inc.	1022
Norcross Corp.	443
Precision Scientific Co.	370-372
Pressure Products Industries, Inc.	1367-1369
Scientific Development Co.	382
Scientific Glass Apparatus Co., Inc.	332
Tenso-Lab., Inc.	1123

### WASH FOUNTAINS

Bradley Washfountain Co.	1128-1130
Logan Emergency Showers, Inc.	883
Cherry-Burrell Corp.	1039-1045-1049
Namco Machinery, Inc.	365
*Protectoseal Co., The	1286

\* For additional information see advertisement in this issue and use your Reader Service postcard, p. 247.



**VISIT THE**  
*Speedline*® **WORKSHOP**  
**BOOTH 980 at the CHEM SHOW**

See actual welding and expanding  
installation methods demonstrated  
**NEW YORK COLISEUM—NOV. 30-DEC. 4, 1959**

**SEE HOW** SPEEDLINE'S  
"EXTRA LENGTH" FEATURE  
makes butt welding easier  
... less costly.

**SEE HOW** SPEEDLINE  
FITTINGS permit use of all  
connecting methods.

**SEE HOW** SPEEDLINE  
ALIGNING CONNECTORS  
simplify joining of light-wall  
pipe.

**SEE HOW** SPEEDLINE  
FLANGES reduce assembly  
costs... eliminate welding.

**SEE A COMPLETE LINE OF SPEEDLINE FITTINGS FOR EVERY PROCESS PIPING REQUIREMENT**

**IN STAINLESS STEEL**  
SCHEDULES 5 AND 10

**IN ALUMINUM**  
SCHEDULES 10 AND 40

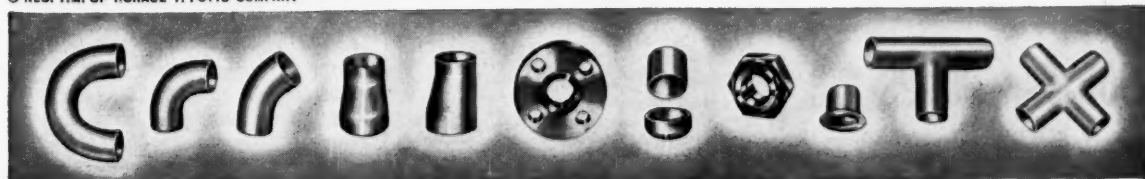
**IN HASTELLOY, TITANIUM**  
AND OTHER ALLOYS

DISTRIBUTORS ARE LOCATED IN PRINCIPAL CITIES FROM COAST TO COAST

*Speedline*®

**CORROSION-RESISTANT FITTINGS**

® REG. T.M. OF HORACE T. POTTS COMPANY



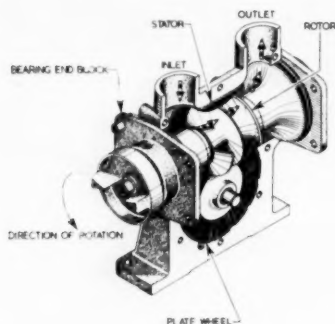
**A Product of HORACE T. POTTS COMPANY • 500 E. Erie Avenue • Phila. 34, Pa.**

CHEMICAL ENGINEERING—November 16, 1959

407

# 2000 YEAR OLD PUMPING PRINCIPLE

ADAPTED FOR  
TODAYS CHEMICAL  
PROCESS INDUSTRY  
REQUIREMENTS



ARCHIMEDEAN SCREW  
PRINCIPLE UTILIZING  
RUBBER - TO - METAL  
WIPING ACTION FOR  
VISCIOUS AND ABRASIVE  
LIQUIDS.

## FEATURES:

- NON-FOAMING
- NON-OXIDIZING
- SELF PRIMING
- SELF LUBRICATING
- PUMPS SOLIDS
- PUMPS ABRASIVE LIQUIDS
- PUMPS LIQUIDS WITH ENTRAINED AIR
- PUMPS CORROSIVE LIQUIDS
- PULSELESS
- LOW NPSH

See This Unique  
Principle Demonstrated  
At Our Booth #1341  
At The Chem Show.

## GOODYEAR PUMPS INC.

9 ROCKEFELLER PLAZA  
NEW YORK 20, N. Y.  
Circle 6-3381

## SHOW DIRECTORY . . .

### WASTE TREATMENT EQUIPMENT

*Bird Machine Co.....	685
Denver Equipment Co.....	1146
*Dorr-Oliver Inc. ....	531
*Eimco Corp. ....	80
Filtration Engineers Div., Amer- ican Machine & Metals, Inc..	456- 506-556
*Hardinge Co., Inc. ....	582
*Komline-Sanderson Engineering Corp. ....	1307-1309
*Link-Belt Co. ....	165
*Western Precipitation Corp.....	1181
Yeomans Brothers Co.....	1156

### WATERPROOFING COMPOUNDS

*Allied Chemical Corp. ....	955-957- 959-961
Carey Mfg. Co., Philip.....	1152
Eagle-Picher Co. ....	1167-1169
Victor Chemical Works..	936-938-940, 963

### WATER-CONDITIONING EQUIPMENT

*Allis-Chalmers Mfg. Co.....	636
*American Meter Co., Inc., Pump Div. ....	150
B-I-F Industries, Inc. ....	660
*Barnebey-Cheney Co. ....	52
Barnstead Still & Sterilizer Co..	416
Delaware Barrel & Drum Co., Inc. ....	1187-1189-1193
Dorr-Oliver Inc. ....	531
*Eimco Corp. ....	80
Filtros Inc. ....	854-856
Hungerford & Terry, Inc..	1164-1166
*Illinois Water Treatment Co....	864
*Industrial Filter & Pumping Co. ....	1188-1202
Milton Roy Co.....	610
Norcross Companies, Sterling E..	991
*Pfaudler Permutit, Inc.....	110 & 141
RKL Controls, Inc.....	1405
Wallace & Tiernan, Inc.....	686
Wilmot Castle Co.....	1033
Yeomans Brothers Co.....	1156

### WAXES

*Allied Chemical Corp.....	955-957- 959-961
Continental Oil Co.....	930

### WELDING EQUIPMENT

American Messer Corp.....	1083
Ampco Metal, Inc.....	412
General Ceramics Corp.....	131
Glascote Products, Inc.....	596
Marindus Co., Inc.....	1440
Nalge Co., Inc.....	1201
Westinghouse Electric Corp.....	510

### WIRE CLOTH

Buffalo Wire Works Co., Inc.....	1381
General Alloys Co.....	193
*Multi-Metal Wire Cloth Co., Inc..	191
Newark Wire Cloth Co.....	183
Scientific Glass Apparatus Co., Inc. ....	332
Southwestern Engineering Co..	1250- 1252
Tyler Co., W. S.....	574

### X-RAY EQUIPMENT

Knapp Mills Inc.....	175
*Westinghouse Electric Corp.....	510

\*For additional information see advertise-  
ment in this issue and use your Reader Service  
postcard, p. 247.

## PROFESSIONAL SERVICES

### E. J. CORELL ENGINEER

Chlorine—Soda Ash—Perchloroethylene  
Pigments and Related Products  
Design—Reports—Operation

42 Rose Bird  
Akron, Ohio

Tele: Akron, O. TE 64271

### CARL DEMRICK

Technical Translations

Send for Circular

53 So. Broadway

Yonkers, N. Y.

### THE KULJIAN CORPORATION

Consultants • Engineers • Constructors  
Chemical • Industrial • Process  
1200 N. Broad St. Phila. 21, Pa.  
Offices Throughout the World

### MERRILL W. MacAFEE

Consulting Engineer

Chemical-Metallurgical-Mining

LUdlow 3-1778  
FRontier 5-6145

7668 Santa Fe Ave.  
Huntington Park, Calif.

### The C. W. NOFSINGER COMPANY

"In Engineering  
It's the PEOPLE that Count"

Engineers and Contractors for the Petroleum  
and Chemical Industries

307 East 63rd Street • Kansas City 13, Missouri

### FOSTER D. SNELL, INC.

Chemical & Engineering Consultants  
Research, Process Development, Pilot Plant  
Studies, Plant Design, Location Studies, Con-  
struction Supervision, Start-up & Operation,  
Equipment Design, Packaging & Materials Han-  
dling Studies, Cost Analyses, Trouble Shooting  
29 W. 15th St. WA-4-8800 New York 11, N. Y.

## The Consulting Engineer

By reason of special training,  
wide experience and tested ability,  
coupled with professional integrity,  
brings to his client detached en-  
gineering and economic advice that  
rises above local limitations and en-  
compasses the availability of all  
modern developments in the fields  
where he practices as an expert.

## ATTENTION . . MECHANICAL & CHEMICAL ENGINEERS & CHEMISTS

### Jobs in Quality Control and in Research and Development

#### WE NEED:

**CHEMISTS**, BS degree and experience in analytical work for supervisory jobs in analytical programs within the polymer fiber and chemical fields.

**CHEMISTS, BS, MS, PHD**, for Research and Development Program in monomer, polymer and fiber fields. Process development experience necessary. Research interest, background and capability should be of the highest caliber.

**MECHANICAL & CHEMICAL ENGINEERS** with B.S. degrees for plastics development involving equipment work in fiber spinning. Fiber process and equipment development experience is required.

**MECHANICAL & CHEMICAL ENGINEERS** with B.S. degrees for plastics development involving equipment and processes. Extrusion and injection molding experience essential.

These are unusual opportunities offering **GROWTH POTENTIAL** and **IDEAL WORKING CONDITIONS** at our **HOPEWELL, VA.,** plant.

#### EXCELLENT SALARY & LIBERAL BENEFIT ARRANGEMENTS

Apply in confidence to:  
Personnel Department

**NATIONAL  
ANILINE DIVISION**

P. O. Box 831,  
Hopewell, Va.



## PROCESS ENGINEERS

McKee has permanent opportunities for Chemical Engineers experienced in process design for Petroleum and Chemical Plants. Openings at our Cleveland offices.

Send detailed resume to:

G. VICTOR HOPKINS

**ARTHUR G. MCKEE & CO.**

2300 Chester Ave., Cleveland 1, Ohio

ADDRESS BOX NO. REPLIES TO: Box No.  
Classified Adv. Div. of this publication.  
Send to office nearest you.  
NEW YORK 36: P. O. BOX 12  
CHICAGO 11: 520 N. Michigan Ave.  
SAN FRANCISCO 4: 68 Post St.

#### POSITION VACANT

**Chemical or Mechanical Engineer, Eastern U.S.** Manufacturer requires experienced Engineer for Process and Mechanical Design of Fired Heaters. Age 30-40. Minimum Experience—5 years. Ch.E. or M.E. degree preferred. All replies will be treated confidentially. P-2972, Chemical Engineering.

#### SELLING OPPORTUNITY AVAILABLE

Some distribution areas left in United States for new type corrosion proof tank liners. Also distributorships available in several foreign countries. RW-2931, Chemical Engineering.

### When Answering

#### BOX NUMBERS . . .

to expedite the handling of your correspondence and avoid confusion, please do not address a single reply to more than one individual box number. Be sure to address separate replies for each advertisement.

## CLASSIFIED . . .

# EMPLOYMENT OPPORTUNITIES

## WANTED:

### Men Seeking A Career Not A Job

Excellent opportunities are now available with Hercules Powder Company for men with a B.S. or M.S. in chemical engineering or a B.S. or M.S. in chemistry. This well established company in the field of organic chemical raw materials and explosives has challenging positions available in:

Research and Development—development of new processes and products also improvement in manufacturing techniques on established products.

Chemical Engineering Design—Equipment design utilizing digital computer—Must be mathematically oriented.

Technical Sales Work      Product Application  
Production Supervision      Analytical Research

Hercules operates on a national scale and openings are in various parts of the U. S. Good working conditions with excellent employee benefit programs are combined with a chance to match your talents to the position most suited to you.

Applicants should be not more than six years from their undergraduate degree. Please send reply giving details of education, professional experience and salary requirements to

Manager, Technical Employment  
Hercules Powder Company  
900 Market Street, Wilmington, Delaware  
All replies will be treated in confidence.

## Senior Project Engineer

Needed immediately for rapidly expanding petrochemical company

Will coordinate and expedite the engineering and construction of new chemical plants. Subsequent opportunities in staff or plant engineering on established or new projects of rapidly expanding petrochemical company.

**Education:** Minimum of B.S. in Ch.E. or M.E.

**Experience:** At least seven years in design, engineering, construction, maintenance, or operation of thermoplastic manufacturing facilities, preferably polystyrene or polyolefin.

**Salary:** Commensurate with experience and qualifications.

**Location:** Initially Midwest, including plant site at Joliet, Illinois.

**Contact:** G. W. Ritter, AMOCO Chemicals Corporation, 910 South Michigan Avenue, Chicago 80, Illinois. Telephone: HArrison 7-8886.

## RESPONSIBLE SUPERVISORY POSITION

Tired of routine work? A challenging position for the capable, imaginative Process Engineer who wants tangible results.

Minimum 2 years as supervisor of graduate engineers in process development. Prefer M.S. Ch.E. and pilot plant experience. Comparable experience will be acceptable.

Outstanding, rapid-growing company in field of solid propellants.

Send Resume To:

Personnel Department

**Thiokol Chemical Corporation**  
Marshall, Texas

# CHEMICAL ENGINEERS

STEADY GROWTH . . . . . with expanding chemical company

BROAD DEVELOPMENT . . . . . industrial projects, covering dye-stuffs, fibers, organic chemicals

PROFESSIONAL CLIMATE . . . . . modern central engineering organization, library, training

CULTURAL LOCALE . . . . . major cosmopolitan, eastern city, university, all recreations

Send resume in confidence to:

Marshall W. Mead  
Engineering Recruitment

**NATIONAL ANILINE DIV.**  
1051 SOUTH PARK AVE.  
BUFFALO 10, NEW YORK



SPECIALIZED ENGINEERS

# DuPONT

## has openings for several specialized engineers

*Critically selective in choosing a career opportunity?*

Our Engineering Service Division offers professional challenge in premium positions. Prime emphasis is on the engineer's individual contribution. In addition to technical competence, successful candidates will have the personal traits required for consulting, liaison, and supervision.

Applied Mechanics • Materials Engineering (Metallurgist) • Fluid Mechanics • Environmental Engineering • Power • Mass Transfer • Reaction Kinetics • Heat Transfer • Solids Processing • Electronics Instrumentation

If you are a graduate engineer (B.S., M.S., or Ph.D.) with from 1 to 5 years' specialized experience, write in confidence to: Mr. Thomas J. Donovan, Engineering Department

E. I. DU PONT DE NEMOURS & CO., INC., WILMINGTON 98, DELAWARE



Better Things for Better Living  
...through Chemistry

### We Need MAINTENANCE SUPERVISORS

IF YOU HAVE a B.S. degree in Mechanical or Chemical Engineering and 5 or more years industrial maintenance experience

we may have just the supervisory spot you are seeking in BUFFALO, N.Y., MOUNDSVILLE, W.VA., or HOPEWELL, VA., offering both CHALLENGE and GROWTH POTENTIAL along with Excellent Salary and Liberal Benefit Arrangement.

If this sounds interesting, send your resume in confidence to: PERSONNEL DEPARTMENT.

**NATIONAL ANILINE DIVISION**  
40 Rector Street New York 6, N. Y.



### Solids Processing Chemical Engineers

\$8,000—\$11,000

Consulting work in solids-liquids separation for multi-plant organization. Excellent growth possibilities. Fee and relocation paid by company.

**MONARCH PERSONNEL,**  
28 E. Jackson Blvd. Chicago 4, Illinois

### CHEMICAL ENGINEERS

Major corporation will employ qualified man as process engineer in plant near St. Louis, Missouri. Must have capabilities for advancing in production supervision. Send complete resume to

P-2974, Chemical Engineering  
520 N. Michigan Ave., Chicago 11, Ill.

### CHEMICAL PLANT PRODUCTION SUPERVISORS

IF YOU HAVE a B.S. in Chemistry or Chemical Engineering and 5 or more years production experience in the chemical industry in a continuous process operation, preferably with a supervisory background, we may have just the spot you are seeking in BUFFALO, N. Y. or HOPEWELL, VA.  
This is an INTERESTING OPPORTUNITY with GROWTH POTENTIAL.

**EXCELLENT SALARY &  
LIBERAL BENEFIT ARRANGEMENTS**

Apply in confidence to: Personnel Dept.

**NATIONAL ANILINE DIVISION**  
40 Rector Street, New York 6, N. Y.



## CHEMICAL, PETROLEUM OR POWER ENGINEERS

The Foxboro Company is adding to its group of staff sales engineers to keep pace with its steadily increasing share of the industrial instrumentation industry market. Men needed should be graduate engineers with several years of instrumentation or process control experience in the chemical, petroleum, gas or power industries. You must be sales minded and should enjoy working with our customers and sales personnel. If you feel qualified for one of these challenging career opportunities send a letter and resume to:

Engineering Recruitment Office

**FOXBORO**

The Foxboro Company, Foxboro, Mass.

### Your Inquiries to Advertisers Will Have Special Value . . .

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publishers to secure more advertisers and—more advertisers mean more information on more products or better service—more value—to YOU.



CLASSIFIED ...

## EQUIPMENT SEARCHLIGHT

### DIESEL ELEC. LOCOMOTIVES

- 3—New 25 Ton, 2 GE 1 Whitcomb.
- 3—23 Ton, 2-45 Ton Used Gen. Elec.
- 1—44 Ton, 1-80 Ton Used Gen. Elec.
- 1—100 Ton, Also Used New 1955.
- 3—100 Ton, Gen. Motors, 600 HP Used.

### PLANT EQUIPMENT

- 2—6' x 36" Hardinge Ball Mills
- 2—4' x 5' Allis-Chalmers Ball Mills
- 2—5' x 8' Kennedy Van-Saun air swept Ball Tube Mills
- 7' x 24' Allis-Chalmers Tube Mill
- 5' x 10' & 7' x 15' Rod Mills
- 14' x 28" New England Jaw Crusher
- 30' x 36" Traylor Type H Jaw Crusher
- 58' x 72" Traylor Style G Jaw Crusher
- No. 1 Sturtevant Rotary Fine Reduction
- 2' Symons Standard Cone Crusher
- 36' x 20' Ruggles Coles Class XF-1 Rotary Dryer
- 2705—24 Link Belt Roto Louver Dryer
- 4' x 20' Rotary Dryer
- 5' x 30' Ruggles Coles Class XA-8 Rotary Dryer
- 5' x 160" Vulcan Rotary Klin
- 42" x 18" Traylor Type AA Crushing Rolls
- 1—10 HP Stephen Adamson 3/60/220/440 Car Puller
- 25 & 30 Ton American Diesel Loco. Cranes with 55' Booms.

**R. C. STANHOPE, INC.**

60 E. 42nd St. N. Y. 17, N. Y.  
Tel. MU 2-3075

### COMPRESSORS

World's Best Rebuilds

- 74 CFM 1500 PSI 6 1/2-3 1/4-1 1/2x7 CP. TCB3
- 100 CFM 150 PSI 6x7 Ing. ES-1
- 104 CFM 2500 PSI 6 1/2-4 1/2-1-11-16x9 IR-ES3
- 110 CFM 3000 PSI Ing. GC 50BW
- 138 CFM 100 PSI 7x7 Ing. Rand ES1
- 238 CFM 100 PSI 9x9 Ing. ES Worth HB
- 311 CFM 1500 PSI 10 1/2-7 1/2-3 1/2x13 IR-ES3
- 465 CFM 100 PSI 12x11-IR-ES-1-Chic. P.T
- 502 CFM 125 PSI 12x13 Chic. T
- 686 CFM 100 PSI 14x13 Ing. ES
- 690 CFM 100 PSI 13 1/2-8x7 CP-YCE
- 823 CFM Vac. 18x7 Ing. ES-1
- 870 CFM 100 PSI 12-10 1/2x12 Ing. XRE
- 3135 CFM Vac. 31x13 Ing. ES Worth HB
- 3798 CFM 125 PSI 29 1/2-17x12 Ing. HHE2
- 600 HP Syn 3-60-2300
- 60"-600" portable—gas or diesel

**AMERICAN AIR COMPRESSORS CORP.**  
North Bergen, N. J. UNion 5-4848

### SPECIAL VALUE

Mojonnier Bros. Vacuum Pan 6' ID, 153 sq. ft. heating surface, 4 banks of 2 coils each. Cap. 4500 to 6000 lbs. water evaporated per hr. Comp. w/cooling tower, cooling tower pump, condensate pump to boiler feed system and condensate sump pump; steam traps, controls, valves, fittings, etc. OD of pan is 5' x 11 1/2", with a condenser on top 3 1/2' x 5 1/2'. Replacement cost today \$16,800. Will accept low cash offer on an "as-is-loaded" basis.



Write—Wire—Phone

**AARON EQUIPMENT CO.**

9370 Byron Street  
Schiller Park, Illinois  
Gladstone 1-1500

### Need a RESIN PLANT?

We offer DESIGN & CONSULTING SERVICES for the following type plants:—

- ACRYLIC EMULSION Plants
- POLYVINYL ACETATE Emulsion Plants
- PHENOLIC RESIN Plants
- UREA & MELAMINE Formaldehyde Resin Plants
- and many others —

**DESIGN & CONSULTING DIVISION of**  
Star Tank & Filter Corp.  
871 Edgewater Rd. N. Y. 59, N. Y.

### OIL REFINERY

DESTREHAN, LA.

Partial List

- 5—B & W 70,000#/hr. Boilers, 450 psi. (1956)
- 1—I. R. 2 Stage Compressor, type 2-HHe2, 3170 cfm, 125 psi, 600 HP. (New 1958)
- 87—Heat Exchangers, 50 to 6000 sq. ft., steel and Adm.
- 40—Pressure Vessels, 3' to 23' dia.
- 190—Centrifugal Pumps, XP motor & turbine drives, up to 9000 gpm.
- 30—Steel Bubble Cap Towers, 2' to 12' dia., up to 109' high.
- 81—Storage Tanks, 1000 to 80,000 barrels.
- 7—Hortonspheres, 5000 to 10,000 barrels.

LIST AVAILABLE ON REQUEST  
REPRESENTATIVE ON PREMISES.

**BRILL EQUIPMENT CO.**

2401 Third Avenue  
New York 51, N. Y.  
Tel: CYPRESS 2-5703

Site Office, Destrehan, La. Phone NORCO 6571

**BALL MILLS**—3' x 12' Abbe/40 HP—4' x 6' Allis Chalmers 60 HP Slip Ring/screwfeeder—Kennedy Van Saun 5' x 6' Enclosed gears/50 HP/scales/feeders/exhausters—Hardinge 6' x 12' w/200 HP Slip Ring/drum feeder.

**HAMMERMILLS**—20 HP Gruendler X—30 HP Mikro 3W—40 HP Jeffrey 24 x 20—50 HP Wms. AKBX—100 HP Jeffrey 36 x 42—450 HP Penna SXT 14.

**ROTARY DRYERS**—24" x 22"—36" x 24"—44" x 25"—5' x 50' (2) all w/motor drives—burners/blowers avail.

**VACUUM PUMPS**—115 CFM Beach Russ 100 RP w/5 HP motor/Vee belt drive.

**SCALES**—12500# capacity dial—Fairbanks Platformatic—8' x 6' Platform.

**FEEDERS**—Syntron FMI,—FM3—w/hoppers/vibrators/controls.

YOUR BEST REBUILT MACHINERY SOURCE

**LAWLER COMPANY**

Durham Ave. Liberty 9-0245 Metuchen, N. J.

## CASH

FOR YOUR IDLE MACHINERY!

For top prices, quick action, contact us.  
Liquidations; appraisals our specialty.

Wire us your list today, or phone GA 1-1380



**MACHINERY AND EQUIPMENT CO.**

123 Townsend St. - San Francisco 7, Calif.

## For Sale ... in Whole or Piecemeal COMPLETE CHEMICAL BY-PRODUCTS PLANT

Koppers Coke Ovens

Quenching Cars and Locomotives

Pusher and Leveler Cars

Coal Crushing and Washing Equipment

Coal Handling and Mixing Equipment

Coal Stocking Bridge

Conveyors and Guides

Acid Regenerating Plant

Benzol Stills for Crude and Finished Products

Coolers, Scrubbers and Piping for Gas

Turbo Exhausters

Naphtha and Ammonia Tanks

Miscellaneous Storage Tanks

3125 KVA Frequency Changer

Piping and Valves

All equipment and spare parts from 280 ovens. Plant is presently complete. Nothing removed. Formerly owned, operated and maintained by U. S. Steel Corporation and known as Joliet Coke and Chemical Works.

Recently shut down.

Write or Wire

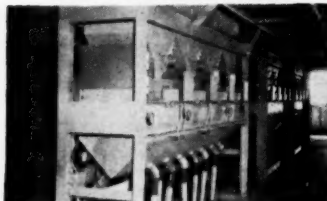
**M. S. KAPLAN COMPANY**

231 So. La Salle Street  
Chicago 4, Illinois

Exclusive Sales Agents For Present Owners  
ANDover 3-3900 Joliet phone: 7-4469

# 1st Offering New Plant On East Coast

Built New In 1955



CARPCO HIGH TENSION SEPARATORS

## BINS

- 1—60 Ton Portable Steel Concentrate with Athay Tracks, 4, 16" x 13" Akins Classifier
- 1—60 Ton Steel Storage, 16" x 10" x 10"
- 1—20 Ton Steel Storage, 6 x 6' x 10'

## CAPACITOR

- 1—20 KVAR General Electric, 440 V

## CLASSIFIER

- 1—24" dia x 15' Akins Spiral, 2 HP drive

## CONVEYOR, BELT

- 1—6" x 27' Carpco Conveyor, BC-68, 3/4 HP Motor
- 1—6" x 13' Carpco Conveyor, BC-68-112, Mag. Pulley & Drive
- 2—6" x 36' Carpco Conveyor, BC-68, 3/4 HP Motor
- 3—6" x 44' Carpco Conveyor, BC-68-105, 3/4 HP Motor

- 1—6" x 48' Carpco Conveyor, 3/4 HP Motor
- 1—6" x 28'-4" Carpco Conveyor, BS-1214, Mag. Pulley & Drive

- 2—4" x 16' Carpco Conveyor, 3/4 HP Motor
- 2—18" x 35'-6" Barber Greene, Model 375, 3 HP Motor

- 1—30" x 51' Belt Conveyor, 5 HP Motorized head pulley.

## DERRIK

- 1—30 HP American Hoist & Derrick, 37' Mast

## DEWATERING SCREW

- 2—12" x 9' Carpco Dewatering Screws, DS12, 1/2 HP

## DREDGE

- 1—6 cu. ft. Yuba Mfg. Electric Bucket Line Complete with Drive & Conveyors.

## DRILL

- 1—Model 1500 Falling Drill rig with Int'l Truck L-164 1957 model, Complete.

## DRYER

- 1—48" x 31'-3" Hardinge rotary, XFZ, Gas Fired, Complete
- 1—36" x 13' Hardinge rotary, XFO, Gas-oil Fired Complete

## ELEVATOR, BUCKET

- 27—Carpco, Vertical, 23'-33' high, 4" and 6" Bucket, w/motor

## FEEDERS

- 1—12" x 5' Carpco Vibrating, with motor
- 1—8" x 23 1/2' Carpco Vibrating, plate, SH 124, 1 HP motor

- 1—Rotary Plate Feeder and 12" x 9' Bin, 2 HP motor

- 1—20" x 6' Shaffer Poidometer Feeder
- 1—10" x 44' Shaffer Poidometer Feeder

## JIGS, MINERAL

- 1—12" x 12" Pan American, 1 cell Type PE-1
- 1—12" x 12" Pan American, 6 cell, w/drive
- 1—24" x 24" Yuba, 2 cell w/drive

- 1—3" Allis Chalmers, 220/440 V
- 1—6" Allis Chalmers, 50HP 220/440 V
- 1—8" Allis Chalmers, 100 HP, 220/440 V
- 1—3" Carpco Warren, 3 HP, 220/440 V
- 1—2" Georgia Iron Wks. Slurry Fig. 2312-G, 10 HP, 440 V
- 1—3" Ingersoll Rand 3RVH 30, 220/440 V
- 1—3" Crane 6 MCL Deepwell Turbine, 7 1/2 HP
- 1—3" Georgia Iron Wks. Slurry, 5 HP

## RECTIFIER

- 1—7 1/2" KW Accurate Engineering, 115V DC, 65A
- 1—5 KW Accurate Engineering 115V DC, 65A
- 1—Carpco Rt. Rectifier, High Voltage, 0-40,000V
- 1—Carpco Selenium, R12-107, 115V DC
- 1—Carpco, Transformer Type AC-29

## SAMPLER

- 5—21" Denver Equipment Co. Type SL

## SCALE

- 1—20 Ton Winslow, Type P, Truck, 24' x 9'

## SCREENS

- 2—6" x 12' Allis Chalmers, overhead, 1 deck
- 1—3" x 5' Tyler Hummer, 1 deck
- 1—18" x 48" Overstrom, 1 deck, 2 HP
- 1—3" x 8' Tyler, 1 deck, Type 38

## TABLES

- 2—BXM-100 Sutton, Steel, Single Deck, Air Type, 10HP

- 1—BXM-200 Sutton, Steel, Single Deck, Air Type, 10HP

- 4—26 Std. Wilfey Concentrating, 1 1/2" HP, 220/440V

- 1—212-S Wilfey Concentrating, 1 HP, 220/440V
- 1—213-S Wilfey Concentrating, 3/4 HP, 220/440V

## TRANSFORMERS

- 3—25 KVA General Elec. 2400-240/480V, Modern
- 3—75 KVA General Elec. 2400-240/480V, Modern
- 3—125 KVA General Elec. 2400-440V

## WEIGHTOMETER

- 1—Merrick, Model S, 12" Belt Complete

## WELDER

- 1—250 Amp Lincoln, Portable, Elec. Drive
- 1—200 Amp Westinghouse, Portable, Electric Drive
- 1—300 Amp Lincoln Shield-Arc, Portable, Gas Drive

Partial Inventory Write For Complete Listings

## MACHINERY CENTER, INC.

P. O. Box 964

Salt Lake City, Utah

HU 4-7601



## GREETINGS CONVENTIONEERS

We have the welcome mat out for you. Pay us a visit while you're in town, and look over our fine stock of prime machinery.



chemical & process  
machinery corp.

52 Ninth St.  
Brooklyn 15, N.Y.  
HYacinth 9-7200

## FOR "IMPOSSIBLE" BUDGETS OUR TERMS MAKE THESE EASY TO BUY

- 1—Robinson size 9 Ribbon Blender, 36 1/2" wide x 100" long. Center Discharge, 7 1/2 HP motor

- 2—Link-Belt Roto-Louvre Dryers, 207-10, and 310-16. Complete

- 1—Braun S.S. Heat Exchanger, 170 sq ft with 102 3/8" O.D. tubes, 10' long 6 pass

- 2—Sperry 36" x 36" plate and frame Filters. 40 chambers. Heresite coated. Hydro closing. Mfr.

- 1—Swenson 10' dia. S.S. Spray Dryer, type 304 construction. Complete
- Sharples PN-14 Super-D-Cantor, type 316 Stainless Steel, 10 HP TEFC Motor

- 1—Bird 40" x 60" Stainless Cont. Centrifuge. Used only 400 hours. 50 HP Motor

- 2—Bufflovak Model J Vacuum Tray Dryers, 20 shelves 60" x 80". Completely equipped

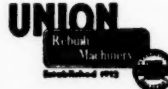
For immediate quote, wire or phone collect—GA 1-1380



MACHINERY AND  
EQUIPMENT COMPANY

123 Townsend St. • San Francisco 7, California

## MODERN REBUILT MACHINERY



- Colton Model 17TF and Stokes Model 90D Automatic Tube Fillers and Closers
- Pneumatic Scale High Speed Automatic Cartoning Line with Feeder, Bottom Sealer, Tap Sealer, Wax Liner, Interconnecting conveyors
- Jones Model CMV flexible Automatic Cartoner Standard Knapp A-B-C and Ferguson Case Sealers
- WRAPPERS: Package Machinery, Hayssen, Battle Creek, Scandia, Wrap-King—all sizes and models
- Colton Model 140 Single Head S.S. Tube Filler
- Stokes & Smith Model DD-2 Rotary Tablet Machine
- Baker Perkins Model JNM Size 14, 50-gal., S.S. Jacketed Mixer
- Werner & Pfleiderer 3,000 gal. and 3,500 gal. Jacketed Double Arm Mixers
- Baker Perkins, Day, W. & P. Heavy Duty Mixers, 12 to 150 gal. caps.
- Stokes & Smith Model G1, G2, G4, HG84, HG87 and HG88 Auger Powder Fillers
- Mikro Pulverizers, 1SH, 2TH, 3TH and 4TH
- Fitzpatrick Stainless Steel Comminutors

Complete Details and Quotations  
Available on Request

WRITE, WIRE, PHONE COLLECT

## UNION STANDARD EQUIPMENT CO.

318-322 Lafayette St. 167 N. May St.  
New York 12, N.Y. Chicago 7, Illinois  
CAnal 6-5333 SEely 3-7845

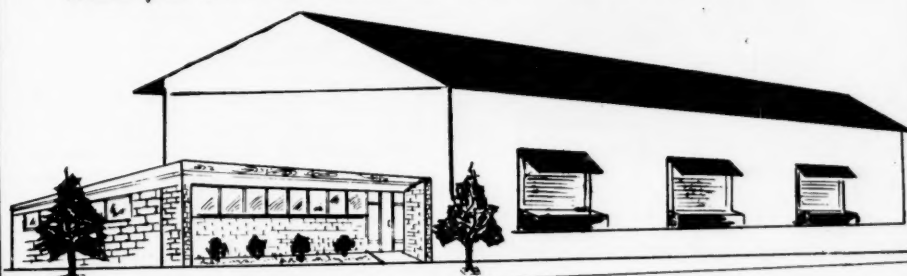
## PIPE

500,000 ft 10 1/2" O.D. 35#  
200,000 ft 12 1/2" O.D. 40#  
200,000 ft 8 1/2" O.D. 25#  
20,000 ft 16" O.D. 42#

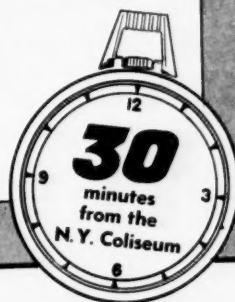
All Machine Cleaned. Plain end. No. 1 Grade.  
INDIANA-OHIO PIPE CO.  
P.O. Box 5412 Shepard Sta. Phone CL 3-5527  
COLUMBUS 19, OHIO

*We extend an Invitation...*

When you visit the CHEMICAL SHOW **VISIT US** at our



**NEW OFFICES & WAREHOUSE**  
**35 JABEZ STREET • NEWARK 5, N. J.**  
**MARKET 3-7420**  
 Adjacent to U. S. Hwy. 1 and the Newark Airport



**REACTORS—EVAPS—CONDS—TANKS**

- 3—2000 gal. Struthers Wells 316 S.S. jktd. agtd. Reactors
- 1—1000 gal. Pfaudler glass lined Reactor.
- 1—550 sq. ft. Bufflovak, monel, single effect Evaporator.
- 1—7500 gal. 316 S.S. Vert. Storage Tank, 7' x 25', 50 PSI.
- 1—750 gal. nickel clad Mixing Tank, 125# nickel coils.
- 1—4000 gal. Havgv Vert. Tank, 8' x 12'.
- 1—1500 gal. Stainless Pressure Tank, 90#.
- 1—12,000 gal. horiz steel Pressure Tank, 7'6" x 36' 200 PSI.
- 8—Stainless Heat Exchangers; 1220, 942, 786, 536, 396, 315, 250, 157 sq. ft.

**CENTRIFUGALS**

- 1—Bird 18" x 28" 316 S.S. Solid Bowl, Continuous.
- 1—Bird 18" x 28", steel, Solid Bowl, NEW, Continuous.
- 1—Bird 36" x 50", 347 S.S. Solid Bowl, Continuous.
- 2—Sharples PY14, PN14, Super-D-Canters, 316 S.S.
- 1—Sharples H2 Nozzlejector, 15 HP, 304 S.S.
- 1—Bird 40" suspended, 347 S.S. perforated basket.
- 2—Sharples #16, 304 S.S., 3 HP motor.

**MIXERS**

- 1—Baker Perkins #16TRM, 150 gal. jktd., Vac. 60 HP.
- 1—Baker Perkins 100 gal. jktd., Sigma Blades.
- 5—Day "Cincinnatus" double arm, 250 and 100 gal.
- 1—1500# Powder Mixer, 7½ HP XP motor.
- 2—Steel, jktd. Powder Mixers, 225 and 350 cu. ft.
- 1—#0 Simpson Intensive Mixer.

**DRYERS**

- 3—Bufflovak Vacuum Shelf, 20—60" x 80" shelves.
- 1—Devine Vacuum Shelf with 19—59" x 78" shelves.
- 1—Devine Vacuum Shelf with 10—40" x 43" shelves.
- 2—Bufflovak 42" x 120", atmospheric, double drum.
- 2—Devine 5' x 12', 4' x 9', single drum, atmospheric.
- 1—Baker Perkins 5'6" x 6' Rotary Vacuum Dryer.
- 1—Bufflovak 3' x 20' Rotary Vacuum Dryer, 316 S.S. Unused.
- 1—Stokes 3' x 15' Stainless Steel Rotary Vacuum Dryer.
- 2—Louisville Rotary Steam Tube 6' x 25', 6' x 50'.
- 4—Rotary Dryers, 4' x 40', 6' x 50', 7' x 80'.
- 2—Louisville 8' x 50' Stainless Steel Lined Rotary Dryers.
- 1—Traylor 30" x 18' Stainless Steel Rotary Dryer.
- 2—Link Belt; 7'5" x 25", 6'4" x 24', S.S. Louvre Dryers.

**FILTERS**

- 1—Oliver 5'3" x 8' Steel Rotary Vacuum, vaporite housing.
- 1—Sparkler 332528 Filter, 150 sq. ft. 304 S.S.
- 1—Niagara 36H110 horizontal Filter, 110 sq. ft., 304 S.S.
- 2—#10 Sweetland Filters, 27 leaves, 4" centers, 250 sq. ft.

**MISCELLANEOUS**

- 1—Stokes R4 Single Punch Preform Press.
- 1—Nash H10 Hytor Vacuum Pump, 1500 cfm.
- 2—Robinson Sifters, 40" x 84", Stainless.
- 3—Robinson Gyrotory Sifters 30" x 104", triple deck.
- 25—Chlorimet, Durimet and Duriron Centrifugal Pumps 1½" to 6".



**BRILL**

**EQUIPMENT COMPANY**

2401 THIRD AVENUE, NEW YORK 51, N. Y.

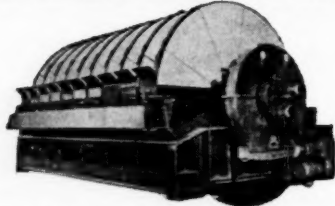
Telephone: CYpress 2-5703 • Cable: Bristen, N. Y.

A SINGLE ITEM  
 OR A  
 COMPLETE PLANT

Write, wire or phone us for complete information — Send us your surplus equipment lists today

## FOR SALE NEW DORR-OLIVER AND EIMCO FILTERS

at 25-40% discount off new



- 4—11'-6" x 16' Dorr-Oliver String Discharge Drum Filters, Stainless Steel, rubber repulpers.
- 3—8'-10" x 10 disc Eimco Hy-Flow Filters, 316 Stainless Steel and rubber covered, 21" repulpers.
- 2—8'-12" x 10 disc Eimco Hy-Flow Neutral Filters.

Write for Complete specifications & prices

### MACHINERY CENTER INC.

1201 So. 6th West Salt Lake City, Utah Phone HU-47601

## WELCOME

When you come to the CHEMICAL SHOW, plan to stop in and see us.

Our experience in solving Chemical processing machinery problems is at your service. Here at HEAT AND POWER we will gladly discuss your equipment requirements and how to satisfy them quickly, effectively and economically.

We are conveniently located opposite Grand Central Station and we will be pleased to hear from you anytime during the Show—or after it! The number to call is—MURRAY HILL 7-5280.

## HEAT & POWER Co., Inc.

CHEMICAL EQUIPMENT DIVISION

60 East 42nd St., New York 17, N. Y.  
310 Thompson Bldg., Tulsa 3, Okla.

## LIQUIDATION TITANIUM DIOXIDE PLANT BALTIMORE, MD.

### CENT.—FILTERS—EVAPS.—CRYSTAL

- 1—Bird 32" x 50" Cent. Cent. 316 S.S.
- 4—Sharples C20 Super D-Hydrators, 316 S.S.
- 1—Sharples PN14 Super-D-Canter, 316 S.S.
- 1—AT&M 26" sus. Cent., perf. bskt., 316 S.S.
- 1—Oliver 8' x 8' Precoat rubber covered Rotary Vacuum Filter.
- 10—Sperry 36" plate & frame Filters, rubber covered, cast iron, and wood.
- 5—8' dia. x 24' rubber lined Crystallizers.

### PULVERIZERS AND MILLS

- 2—Abbe 5' x 16' brick lined Mills.
- 2—30" dia. Stainless Steel Micronizers complete with Hoppers, Conveyors, etc.

### ROTARY KILNS

- 1—Traylor 11' x 155' Rotary Kiln, 7/8" shell.
- 1—Renn. 6' x 60' Rotary Kiln, 3/8" shell.

### RUBBER LINED TANKS

- 5—8500 gal. Vertical Storage 8'6" x 16' x 8' cone
- 1—13,000 gal. Horizontal Storage 8' x 35'.

### STEEL TANKS

- 6—2000 to 5200 gal. with Turbo Agitators.
- 15—Storage Tanks: 3800; 6000; 9000; 10,000; 15,000; 47,000 gals.

### MISCELLANEOUS

- 7—Dorr Thickeners: 16' dia. with Tanks.
- 1—Demis 50± Bag Packer with Sewing Machine, Conveyor and Flatteners.
- 65—LaBour, Durco, Worthing, Duriron and Stainless Steel Centrifugal Pumps 2" to 6" with motors.

Representatives on premises,  
2701 Broening Highway, Baltimore, Md.  
Telephone: Medford 3-2911

**BRILL EQUIPMENT CO.**  
2401 Third Avenue,  
New York 51, N. Y.  
Tel: CYpress 2-5703

## LOEB OFFERINGS

Autoclave: 50 gal. Struthers Wells, st. st.  
Centrifugal: Tolhurst 20" st. steel (New).  
Clarifiers: DeLavel and Sharples, st. steel.  
Dewaterers: Davenport 3A, bronze hd. 3 hp.  
Disintegrator: Rietsch RD18-P, 75 hp.  
Dryers: Devine 2 x 4' vac. drum, st. steel.  
Dryers: Link-Belt Monotube of monel.  
Filters: Eimco, Oliver, Sweetland, Alsop.  
Homogenizers-Dispenser: Tri-Homo #10, #4.  
Kettles: St. Steel, with and without ag.  
Dopp 150 gal. dbl. act. agitator.  
Mills: Mikro Bantam, ISH, 3DH, type 24.  
Fitz Communiting model D, st. st.  
Colloid, 3, 5, 20, 25 hp.  
Cog stain. steel, 10 hp.  
Hammer: Williams, Jeffery, Prater, Ray.  
Mixers: Dbl. and Sgl. arm sigma blade.  
Dry Powder, various sizes.  
Baker-Perkins size 17, 90 hp.  
Mix-Muller Simpson 18" lab., 39 1/2" Porto.  
Percolator: Paudler 54 x 42" st. st. jack.  
Pumps: Rotary, gear, centrli., vacuum.  
Rectifying Column: 16" x 30' Brighton.  
Screens: Selectro 4 x 10', 3-deck.  
Still: Double effect st. st. 11.83 gal.  
Vacuum Pan: 42" Harris st. steel.

**LOEB EQUIPMENT SUPPLY CO.**  
810 WEST SUPERIOR ST. CHICAGO 12, ILLINOIS

Dryers, Kilns, Centrifugals, Filters, Kettles, Tanks, Grinders, Crushers, Mixers, Screens, Tablet Machines, etc. Hydraulic, Plastic and Rubber Machinery. Send for bulletins.

### STEIN EQUIPMENT CO.

107—8th STREET BROOKLYN 15, N. Y.  
Sterling 8-1944

## MACHINECRAFT

8 S. Reactor 1200 gal 200 lb pressure  
Baker Perkins 150 gal 10 HP. 100 gal 50 HP  
both S.S. 2 arm jacketed vacuum hydr. tilt  
Blaw-Knox 2 gal S.S. Autoclave 5000 lbs.  
50 gal S.S. Autoclave 2000 lbs pressure  
3 1/2 gal. S.S. Autoclave, 2000 lbs. pressure  
vulcanizer 60" x 9' 125 lbs.  
Sweetland #2 all stainless  
Stainless steel Ball Mill  
Aluminum Condenser 350 sq. ft.  
Aluminum Evaporator Calandria type, never used.  
1300 sq. ft. tube area  
Proctor & Schwartz Binod drum driers  
Continuous Stripping column 2 X 13 Steel  
Calenders 3 Roll 45" X 18"; 6 Roll 12" X 5"  
Hydraulic Pumps, Motors.

### LOUIS SUSSMAN, INC.

800 Wilson Ave. (East of Doremus)  
Newark 3, N. J. MI 2-7631

## "GEARED TO SERVE YOU"

1 Cu. Ft. S/S double cone Blender M.D.  
100 gal S/S jkt'd Kettle, clamped cover  
Sparkler Stainless 1458 Filter  
Filter Presses from 5" to 36"  
125 gal Stainless Steel Percolator  
Mixers from 50 lb. to 1250 lbs.  
Stokes F. R. RD3 Tablet Presses  
Devine 8 shell 40" x 42" Dryer  
Mikro Model IS1—3 HP motor  
Standard Knapp wrap-around Can Labeler  
500 gal burstone & steel Ball Mills

**JASPER MACHINERY COMPANY, INC.**  
282—Sixth Street Brooklyn 15, N. Y.  
STerling 8-8308

## BEST BUY

### ROTARY KILN

6 x 7 x 100'. Heavy shell. Complete with fire head, motor and drive.

Priced low. Must move.

Wire or phone collect—GA 1-1380

**ME MACHINERY AND EQUIPMENT CO.**  
123 Townsend St. San Francisco 7, Calif.

### ECH SPECIAL

Baker Perkins Mixer, serial #40722, double arm, cored sigma blades, size (15-VI) M-BS 100 gal. working, jkt'd. on 4 sides, forward & reverse motion. New cost over \$15,000. Our price \$6,500.

**YOU CAN BANK ON  
EQUIPMENT CLEARING HOUSE, INC.**  
111 33rd Street, Brooklyn 32, N. Y.  
SOUTH 8-4451—4452—8782

Watch—  
the Searchlight Section  
for  
Equipment Opportunities

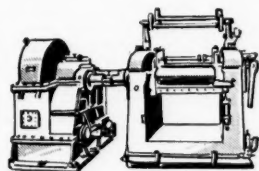




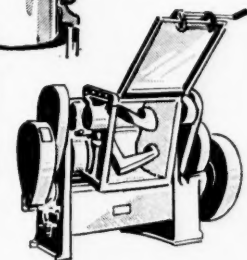
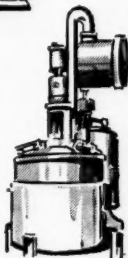
## Coming to NEW YORK for the CHEMICAL EQUIPMENT SHOW?

### See a DOUBLE HEADER—Visit the FMC EQUIPMENT EXHIBIT Too!

Make your trip doubly worth while by inspecting First Machinery's HUGE STOCK of desirable chemical and processing equipment. Much more to see and every machine is available IMMEDIATELY. Only 20 minutes by Subway from the Coliseum to FMC Headquarters.



Pfaunder Glass Lined, Jkt'd. Reactors to 1000 gal.  
Struthers Wells 2000 gal. Stainless Steel Reactor  
Mojonnier Stainless Vacuum Pans 3'x10'; 6'x12'  
Harris Stainless Coil Heated Vac. Pan 6' Diam  
Lancaster Stainless Lined Rot. Jkt'd. Reactor; 50"x17'4"  
Buffalo Cast Lead Evaporators; 5' and 6' Dia. & accessories  
Nickel Clad Reactor; 7'x11'6" Manhole; Jacketed and Agitated  
Patterson 1000 gal. Closed Jkt'd. Steel Mixing Kettle; 20 HP  
Three Stage Continuous Agitated Reactor; 3 Vessels 4'x20'  
Type 316 Stainless Separator Tanks; 42"x10'; Dished Heads  
A. O. Smith Stainless Lined Pressure Tanks; 10'x18'7"; 11,000 gal.  
Heavy Duty Aluminum Tank; 5000 gal.; 8'x12'; 30 PSI ASME



F-B NEW Rubber or Plastic Mills 14"x30"  
Baker Perkins Heavy Duty Mixers to 300 gal.  
Stokes and Colton Pre-Form Tablet Presses  
Rubber Stock Cutters-Plastic Granulators  
Ball & Jewell and Abbe Rotary Cutters  
Stainless Steel Vacuum Mixers; Double Arm; 150-500 gal.  
Baker Perkins Jacketed Dbl. Arm Mixers, 100, 150, 200, 300 gal.  
2 Baker Perkins KO-Kneaders Model K 300; Jacketed  
Baker Perkins Hexagonal Jacketed Baratte; 150 gal. 36"x39"  
Blaw Knox Conical Blender; 300 Cu. Ft.; 9'6" Diameter  
Muller Type Batch Mixers by Simpson, Lancaster to 6' Diameter  
NEW FALCON Double Ribbon Blenders in Steel or Stainless; all sizes

Blaw Knox & Buflavak Stainless Rot. Dryers; 54"x30" and 60"x30"

Monel Rotary Dryer 42"x30" with 7½ HP Motor and Accessories

Stainless Lined Rotary Dryer 50"x20' with Com. Chamber etc.

Stokes Rotary Steam Jacketed Dryer; 18"x8' complete

Bagley & Sewell Double Drum Dryer; 28"x60" complete

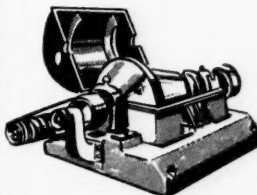
Buflavak Double Drum Dryer 40"x120" with accessories

Louisville Stainless Rotary Dryer; 30"x28'; Indirect Fired

American Jacketed Sterilizer; 30"x48"x84"; Double Door

2 American Dbl. Wall Lab. Sterilizers; 16"x24"; Gas or Electric

Pfaunder Stainless Jacketed Evaporating Dishes; 6"x28"



Bird Continuous Conical Hor. Centrifuges; 18", 24", S.S. & Monel

Sharples H2 Nozzlejector; 15 HP XPL Motor; 1000 GPH

Sharples Model M 4 P Super Centrifuges in MONEL

De Laval Type 316 Stainless Hermetic Separator VO-244

#### FATTY ACID INSTALLATION SYSTEM

Includes Ni-Resist Still Pots, Monel and Steel Tanks, Stainless Heat Exchanger, Condensers, Receivers, BOILER, Jet and Booster Ejectors, Pumps, Filters and accessories. Send for complete details.

Oliver Continuous Rotary Panel Type Vacuum Filters; 8'x8' and 8'x10'

Oliver Monel Pre-Coat Cont. Rotary Pressure Filters; 3'x2' complete

Oliver Dorco Rotary Vacuum Filter 6'x3' with Nickel contact Parts

Bird Young Rotary Vac. Filter 4'x4'; Stainless

Sweetland Pressure Filters from No. 2 to 12

Enzinger Stainless Vert. Pressure Filter 18"x36"; ASME; 24 sq. ft. filter area

Shriver: Aluminum Filter Presses; 7" & 18" & 30", 36" Sperry Stainless Filter Presses in sizes 12", and 18"

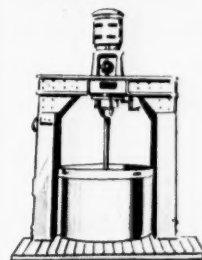
Ni-Resist and Nickel Filter Presses in sizes, 10" and 18"

Shriver and Sperry Cast Iron Presses from 12" to 42"

Fletcher 12" Stainless Under-driven Centrifuge

A.T.&M. & Tolhurst Rubber Covered Centrifugals from 26" to 48"; various types

SPECIAL A.T.&M. Battery of 60" Type 316 Stainless Centrifugals; Center Slung, Suspended; Fume Tite



# FIRST MACHINERY CORPORATION

209-289 TENTH STREET, BROOKLYN 15, N. Y.

STerling 8-4672

**JUST PURCHASED**

- 1—1865 sq. ft. T316 SS heat exchanger. ASME, removable bundle.
- 1—Link-Belt #604-18 roto-louvre dryer, 6'4" dia. x 18' long, w/cyclone, fans, etc.

**STOCK ITEMS****STAINLESS REACTORS—KETTLES**

- 1—3500 gal. T316 SS, jkt. & agit.
- 2—2250 gal. T316 SS, jkt. & agit.
- 1—2200 gal. T316 SS, jkt. & agit., VAC.
- 1—1300 gal. T304 SS, jkt., 5 HP XP agit.
- 3—750 gal. T304 SS, jkt. & agit.
- 1—500 gal. T304 SS, jkt. & agit.
- 6—465 gal. T304L SS, jkt. & agit.
- 1—350 gal. T304 SS, jkt. & agit.
- 2—125 gal. T316 SS, jkt.

**ROTARY KILNS—DRYERS**

- 1—11' x 155' Traylor, 7/8" shell Kiln.
- 3—10' x 80' rotary dryers, 3/4" shell.
- 1—8' x 125' Kiln, 5/8" shell.
- 2—7'6" x 100' 1/2" shell Kilns.
- 1—7'6" x 60' Kiln, 1/2" shell.
- 3—Hardinge 8'8" x 70' dryers, 5/8" shell.
- 1—7'6" x 60' dryer, 1/2" welded shell.
- 1—Allis-Chalmers 7' x 50' dryer, 5/8".
- 1—6' x 50' Louisville dryer.
- 6—Steel dryers: 5'6" x 50', 4'9" x 32', 4'6" x 40', 4' x 30', 3' x 15'.
- 2—Stainless dryers: 4'6" x 12', 3' x 10'.

**TANKS**

- 1—8000 gal. T304 SS, vert.
- 12—4500 gal. nickel-clad, vert. 125#.
- 1—3000 gal. alum., vert., open.
- 1—10,500 gal. T304 SS, horiz., UN-USED, dished heads.
- 2—5700 gal. T304 SS, horiz., UNUSED.
- 4—Vacuum tanks w/coils, T304 SS: 3700, 3000, 2350, 1750 gal.
- 1—3400 gal. T304 SS, horiz.
- 1—2000 gal. T316 SS, hopper.
- 8—1750 gal. T304 SS, hoppers.

**JUST PURCHASED**

- 1—Kennedy 7' x 9' contin. ball mill, integral herringbone drive, 1948—150 HP. Like New!
- 1—10' dia. x 230' long rotary Kiln.

# LIQUIDATING

## CHEMICAL PLANT—ORANGE, TEXAS

- 1—Struthers Wells 630 sq. ft. T316 SS evaporator.
- 2—1,800 cu. ft. Read weight hoppers, T304 SS, 11'10" x 10'5" x 10'2", hopper bottom, fulcrums, scales avail. w/bucket elevators, conveyors, etc.
- 3—Worthington 160 ton steam-jet vacuum refrigeration units.
- 3—18,000 gal. alum. cone-bottom tanks, 12' x 31' OAH.
- 2—Buffalo T316 SS blowers, 2330 cfm, 60 HP. TEFC motors.
- 2—American T316 SS blowers, 5600 cfm., 50 HP. TEFC motors.

**CENT.—FILTERS—CRYSTALLIZERS**

- 2—Sharples #16-P Pressurite, T304 SS.
- 2—Sharples C-20 Super D-Hydrators, T316 SS.
- 1—Alco 110 sq. ft. pressure leaf filter, T316 SS.
- 1—Struthers-Wells vacuum crystallizers, 1200, 560 gal., T316, cone bottoms.
- 1—Eimco T304 SS rotary vac. filter, 18" dia. x 24" face.

**EXCHANGERS—CONDENSERS—COOLERS**

- 12—800 sq. ft. T316 SS heat exchangers, removable bundle.
- 75—T316 tubular heat exchangers & condensers, 2000, 1450, 880, 800, 750, 600, 530, 427, 400, 300, 264, 250, 235, 200, 185, 165, 150, 125, 64, 50, 47, 30 sq. ft.
- 25—Copper & Cupro-Nickel heat exchangers & condensers, up to 1070 sq. ft.

**TYPE 316 SS KETTLES**

- 1—3,500 gal. Struthers-Wells vert., 7' dia. x 12' high, jacketed, int. coils, 40/20 HP agit.
- 1—2,830 gal. horiz. still kettle, 6' x 12' 100 sq. ft. int. coil.
- 2—2,250 gal. vert., 7' dia. x 6'3" high, jacketed, 3 HP agit.
- 1—2200 gal., 6'6" x 8', vacuum, jacketed, agit. T316 SS.

**TYPE 316 STAINLESS STEEL PRESSURE TANKS**

- 1—17,650 gal. horiz., 9' dia. x 36' long, 1/4" shell, 3/8" dished heads, 40# WP
- 1—2,830 gal. horiz., 6' x 12', 5/16 shell & dished heads, VACUUM, or 80# WP
- 3—2,750 gal. horiz., 7' x 8', dished heads, int. coils, 50# WP
- 9—2,300 gal. vert., 7' x 8', int. coils, (some w/agit), 19# WP
- 5—2,250 gal. vert., 7' x 6'3", dished heads, (some w/agit., some w/jacket), 70# WP
- 2—1,900 gal. vert., 6' x 8', 3/8" shell & dished heads, VACUUM, or 100# WP
- 4—1,200 gal. vert., 5' x 7', dished top, cone bot., VACUUM, or 100# WP
- 6—685 gal. vert., 3' x 13', internal coils.
- 1—575 gal. vert., 4' x 6', dished heads, 90# WP, 355 sq. ft. int. coils.
- 50—Tanks & pots, 30 to 500 gal., T316 SS.

**COLUMNS—STAINLESS STEEL**

- 1—110" dia. Vulcan, 10 trays—bubble caps, T316 SS.
- 2—96" dia. Vulcan, 30 trays—bubble caps, T316 SS.
- 1—96" dia. Vulcan, 10 trays—bubble caps, T316 SS.
- 2—60" dia. Vulcan, 10 trays—bubble caps, T316 SS.
- 1—48" dia. Vulcan, 25 trays—bubble caps, T304 ELC SS, 100 PSI.
- 3—24" dia. Vulcan, 12 trays—bubble caps, T316 SS—VACUUM.
- 6—T316 SS Packed Columns: 42", 36", 30" dia.
- 5—Steel Packed Columns: 60", 48", 36", 30", 20".

**COLUMNS—COPPER**

- 5—Vulcan copper bubble-cap columns, VACUUM! 72" x 40 plate; 48" x 25 plate; 48" x 22 plate; 24" x 20 plate.

SEND FOR  
LATEST INVENTORY  
LIST #859-A

**MISCELLANEOUS EQUIP.**

- 2,000T316 SS flanged valves, globe or gate, 1/2", 1", 1 1/2" up to 12".
- 10,000—T316 SS pipe, schedule 40, 10, 5, sizes 1/2", 1", 1 1/2", 2" up to 12".
- 35—T316 SS pumps, sizes from 6" x 5" to 1" x 1".
- 1—Otis elec. freight elevator, 5,000# capacity @ 75 FPM.
- 2—Stainless steel reboilers.
- 2—Stainless steel bucket elevators, 60' & 40' high.
- 1—2,100 gal. vert. alum. tank, coils.
- 10—T316 SS separators, 22" x 8' deep.
- 1—2,000 gal. copper tank.
- 3—18,000 gal. steel tanks.

SEND FOR CIRCULAR

# PERRY

## EQUIPMENT CORPORATION

1413-21 N. SIXTH ST.

PHILADELPHIA 22, PA.

Phone POplar 3-3505

# It's easy to see the outstanding values in **GELB** CHEMICAL PROCESS EQUIPMENT

- 1—Buflavak SS rotary vacuum dryer 3' x 15'
- 1—Pfaudler 200 gal. glass lined reactor with impeller type agitator and drive.
- 1—Process Engineering SS jacketed reactor, 1500 gal., 140# W.P. jacket, 150# W.P. shell
- 1—Tolhurst 40" suspended type heresite lined centrifuge with perforated basket complete with motor and plow

## AUTOCLAVES, KETTLES AND REACTORS

- 1—Allied Steel Products type 316 SS jacketed reactor, 750 gal.
- 3—Type 316 SS 150 gal. jacketed reactors, complete with agitators and drives.
- 1—Steel and Alloy Tank Co. 100 gal. type 347 SS pressure tank, 250 psi. jacket
- 1—Blaw-Knox 400 gal. steel jacketed autoclave, 570# internal pressure, 85# jacket
- 1—Blaw-Knox 45 gal. jacketed autoclaves, 1500# pressure
- 1—Pfaudler 500 gal. glass lined jacketed reactor, complete with impeller type agitator, baffle and drive
- 1—Struthers Wells 500 gal. nickel jacketed reactor
- 1—Patterson-Kelley 6000 gal. steel jacketed reactor, 40# jacket, complete with agitator and drive.
- 1—Patterson 2000 gal. steel jacketed reactor
- 28—30,000 gal. steel vertical storage tanks

## DRYERS

- 1—Link Belt steel roto louver dryer, Model 1003-30
- 3—Link Belt steel roto louver dryers, Model 207-10, 310-16, 604-20
- 1—Buflavak double drum dryer 42" x 120"
- 3—J. P. Devine single door vacuum shelf dryers, 20, 17 and 12 shelves
- 1—Stokes stainless steel rotary vacuum dryer, 2' x 6'
- 1—Stokes Model 59DS steel rotary vacuum dryer, 5' x 30'
- 1—Stokes double drum dryer, 5' x 12'
- 1—Louisville rotary steam tube dryer, 8' x 45'
- 2—Louisville SS rotary dryers, 8' x 50'
- 1—Louisville SS rotary kiln, 30" x 28", complete
- 1—Louisville rotary dryer, 38" x 40", Type L
- 1—Ruggles Coles 4' x 30' rotary kiln
- 1—Traylor 4' x 40' rotary dryer
- 1—Rotary dryer, 6' x 36'

## FILTERS

- 3—Dorrco rubber covered filters, 6' x 2'
- 1—Sweetland #3 stainless steel filter
- 1—Niagara SS filter, Model 510-28
- 1—Oliver horizontal filter, 3'
- 10—Shriver plate and frame filter presses, 12" to 42"
- 1—Shriver C.I. plate and frame filter press, 36" x 36" closed delivery, 4 eye, 60 chambers
- 1—Shriver rubber lined filter press, 36" x 36"
- 12—Sweetland #12 filters with 72 SS leaves

## CENTRIFUGES

- 1—Tolhurst SS 20" suspended type centrifuge with perforated basket, complete with plow and motor
- 1—AT&M 26" suspended type centrifuge with SS perforated basket, complete with plow and motor
- 1—AT&M 48" SS suspended type centrifuge, complete with plow, motor and imperforate basket
- 1—Bird type 316 SS centrifuge, 32" x 50"
- 4—Tolhurst 30" center slung rubber covered centrifuges with perforated baskets and motors



THE GELB GIRL—NOVEMBER 1959

## VISIT OUR SHOW TOO!

If you want to inspect a vast array of chemical processing equipment—or just discuss a process equipment problem—call on Gelb at Murdock 6-4900. We will be glad to hear from you.

## MIXERS

- 15—Robinson type 304 SS horizontal blenders, 255 cu. ft. each
- 3—Robinson type 316 SS sigma blade jkid. H.D. mixers, 400 gal.
- 1—Baker Perkins Size 6, double arm vacuum mixer, 2¼ gal. cap.
- 1—12' x 4' pug mixer, type 316 SS
- 1—Patterson type 347 SS jacketed vacuum sigma kneader master, 500 gal.

## MISCELLANEOUS

- 1—Cleaver Brooks 500 HP package steam generator, 200#
- 1—Ames 300 HP package steam generator, 150#
- 2—Cleaver Brooks package steam generators, 50 & 80 HP, 125#
- 2—Heat Transfer Products steel bubble cap columns, 36" and 42" with 5 and 10 trays
- 1—Acme steel bubble cap column, 42" dia. with 10 trays
- 2—Patterson-Kelley steel heat exchangers, 1000 sq. ft. each
- 6—Struthers Wells heat exchangers, 885 sq. ft.
- 1—Patterson-Kelley steel heat exchanger, 427 sq. ft.
- 50—Steel heat exchangers from 15 sq. ft. to 400 sq. ft.
- 25—Davis Eng. SS heat exchangers, 145 and 230 sq. ft. (NEW)
- 1—Struthers Wells type 316 SS heat exchanger, 330 sq. ft.
- 2—Condenser Service type 316 SS heat exchangers, 350 sq. ft.
- 3—Badger type 316 SS heat exchangers, 500 sq. ft. and 600 sq. ft.
- 1—Badger type 316 SS bubble cap column, 42" dia. with 11 trays
- 1—Badger type 316 SS bubble cap column, 36" dia. with 8 trays
- 1—Vulcan SS bubble cap column, 4' x 28 plates
- 3—Robins shaker screens, SS, 3' x 6'
- 1—Swenson type 316 SS vacuum crystallizer, 3'6" x 12'
- 1—Swenson type 316 SS vacuum crystallizer, 2' x 12'
- 1—Blaw Knox steel distillation column, 36" x 40', 24 trays (NEW)
- 3—Williams type 316 SS hammermills, Model AK
- 1—Stokes Model 8 tablet press
- 1—Swenson SS pilot plant spray dryer

- 2—Sturtevant #7 SS dust type rotary batch blenders, NEW
- 1—Oliver SS rotary pressure precoat filter, 5'3" x 8'
- 4—Stokes Model 138J-20 single door vacuum shelf dryer, 20 shelf
- 1—Baker Perkins Size 16 Type UUEM 150 gal. jacketed double arm dispersion type mixer, complete with compression cover and 100 HP motor.

Established 1886

# R. GELB & SONS, Inc.,

CHEMICAL, RUBBER, OIL, PLASTIC and FOOD PROCESSING MACHINERY  
U.S. HIGHWAY No. 22, UNION, N.J. • MURDOCK 6-4900

# INDEX OF ADVERTISERS

Month after month you'll find industry's most progressive firms among our ad pages.

Use this index to keep in touch with what they're offering that'll help you in your job.

Abbé Engineering Co. ....	324
ACF Industries Incorporated	
W-K-M Division .....	74-75
Acme Hamilton Mfg. Co. ....	153
Acme Process Equipment Co. .	107
Adams Co., R. P. ....	225
Aeroquip Corp. ....	325
Aldrich Pump Co. ....	405
Allegheny Ludlum Steel Corp..	125
Allen Bradley Co. ....	81
Allied Chemical Corp.	
(Baker & Adamson)	
General Chemical Div. ....	93
Solvay Process Div. ....	117
Allis-Chalmers .....	253, 255, 257, 259
Allis Co., Louis. ....	305
Alloy Steel Products Co. ....	127
Aluminum Co. of America	
(Electrical-General) .....	203
Amchem Products, Inc.	
Metalworking Div. ....	376
American Air Liquide Co. ....	156
American Brass Co. ....	150
American Can Co. ....	207
American Hard Rubber Co. ....	234, 235
American Machine and Metals,	
Inc. ....	28-29, 146, 406
American Meter Co.	
Pump Division .....	348
American Optical Co. ....	52
American Potash & Chemical	
Corp. ....	383
Appleton Electric Co. ....	88
Armco Steel Corp. ....	131
Armstrong Machine Works ....	385
Artisan Metal Products Co. ....	162
Aurora Pump Division.	
The New York Air Brake Co..	64
Avondale Marine Ways, Inc. ....	262
Babcock & Wilcox Co.	
Tubular Products Div. ....	170
Bailey Meter Co. ....	401
Baker Perkins Co. ....	375
Baldwin-Ehret-Hill, Inc. ....	158

## Advertising Sales Representatives

Atlanta 3 .....	W. O. Crank
1301 Rhodes-Haverty Bldg.,	Jackson 3-6951
Boston 16 .....	A. S. Reed
350 Park Square Bldg.,	HUBbard 2-7160
Chicago 11 .....	D. Gridley, J. M. Rodger, Jr.
520 N. Michigan Ave.	MOhawk 4-5800
Cleveland 13 .....	L. J. Biel
55 Public Square	SUPerior 1-7000
Dallas 1 .....	Robert T. Wood
Vaughan Bldg., 1712 Commerce	
Riverside 7-5117	
Denver 2 .....	John Patten
1740 Broadway	Alpine 5-2981
Detroit 26 .....	Chas. M. Crowe, Jr.
856 Penobscot Bldg.	WOODward 2-1793
Frankfurt/Main .....	Michael R. Zeynel
85 Westendstrasse	
London EC4 .....	E. E. Schirmer
95 Farringdon St.	
Los Angeles 17 .....	John B. Uphoff
1125 W. Sixth St.	HUNTley 2-5450
New York 36, R. G. Frederick, A. I. Gregory,	
John R. Emery	OXford 5-5959
500 Fifth Ave.	
Philadelphia 3 .....	E. M. Schellenger
6 Penn. Center Plaza	LOCust 8-4330
Pittsburgh 22 .....	G. S. Ryan
1111 Oliver Bldg.	EXpress 1-13-14
San Francisco 4 .....	W. C. Woolston
68 Post St.	DOUglas 2-4600
St. Louis 8 .....	J. M. Rodger, Jr.
3617 Olive Street	JEFFerson 5-4867

Barber-Colman Co. ....	38-39
Barneby-Cheney Co. ....	252
Becco Chemical Div., Food	
Machinery & Chemical Corp. 133	
Bethlehem Foundry & Machine	
Co. ....	242, 243
Bird Machine Co. ....	2
Black, Sivalls & Bryson, Inc.	
(Safety Head) ....	364
Boardman Co. ....	404
Bowen Engineering Co. ....	293
Bridgeport Brass Co. ....	157
Bristol Co. ....	22-23
Brooks Rotameter Co. ....	391
Brown Co. ....	237
Buffalo Forge Co. ....	57
Carborundum Co. ....	152
Carpenter Steel Co. ....	83
Carrier Conveyors Corp. ....	327
Celanese Corp. of America ....	113
Centrico, Inc. ....	355
Chemical & Power Products, Inc.	
Chemicolloid Laboratories, Inc..	338
Chemineer, Inc. ....	312
Chicago Bridge & Iron Co. ....	8-9
Chicago Pneumatic Tool Co. ....	50-51
Chiksan Co. ....	155
Clark Bros., One of the	
Dresser Industries, Inc. ....	109
Cleaver Brooks Co.	
Boiler Div. ....	230
Combustion Engineering, Inc.	
Raymond Division .....	172
Commercial Filters Corp. ....	128
Consolidated Vacuum Corp. ....	226, 356
Continental-Emasco Industrial	
Products Div. of Youngstown	
Sheet & Tube Co. ....	291
Continental Tin Co. ....	271
Cooper Alloy Corp. ....	351-354
Cooper Bessemer Corp. ....	44-45
Coppus Engineering Corp. ....	147
Corning Glass Works ....	245
Crane Packing Co. ....	241
Crossley Machine Co. ....	346-347

Daffin Manufacturing Co. ....	334
Darling Valve & Mfg. Co. ....	367
Davenport Machine & Foundry	
Co. ....	358
Day & Co., J. H. ....	209
Dean Brothers Pumps, Inc. ....	341
DeLaval Separator Co. ....	10-11
DeZurik Corp. ....	66
Devine Mfg. Co., J. P. ....	271
Dings Magnetic Separator Co..	
Dorr-Oliver Co. ....	90-91
Dow Corning Corp. ....	72
Dracco, Div. of The Fuller Co. ....	67
Ducon Company, The .....	222, 223
duPont de Nemours & Co.,	
(Inc.), E. I.	
Fabrics .....	151
Polychemicals Dept., Teflon.	95
Duralab Equipment Corp. ....	244
Durametallic Corp. ....	386
Duriron Company, Inc., The. ....	211, 219
du Verre, Inc. ....	271

Eastern Industries, Inc. ....	263
Eaton-Dikeman Co. ....	374

Eclipse Fuel Engineering Co.,	
Boiler Division .....	402
Eco Engineering Co. ....	33-36
Elmco Corporation ... Second Cover	
Electric Controller & Mfg. Co.,	
Div. of Square D Company	
Third Cover	
Elliott Company .....	251
Enjay Company, Inc. ....	121
Eriez Mfg. Co. ....	260
Exposition of Chemical	
Industries .....	273

Fairbanks, Morse & Co. ....	400
Fansteel Metallurgical Corp. ....	205
Farval Corporation .....	141
Fisher Governor Co. ....	48-49
Fletcher, a Division of The	
Sharples Corporation .....	303
Fluid Energy Processing &	
Equipment Co. ....	387
Fluidizer Co. ....	140
Forge & Fittings Div.	
H. K. Porter Company, Inc. ....	372
Formed Steel Tube Institute ....	379
Foster Wheeler Corp. ....	173
Foxboro Co. ....	165
Freeport Sulphur Co. ....	115
Frick Co. ....	238
Fuller Company, The .....	69, 71

Garlock Packing Co. ....	70
General American Transporta-	
tion Corp.	
Kanigen Division .....	63
Louisville Dryer Div. ....	61
Turbo Mixer Div. ....	59
General Controls Co. ....	68
General Tire & Rubber Co.	
Bolta Products Div. ....	372
Glas-Col Apparatus Co. ....	134
Glascote Products, Inc. ....	53-56
Goodrich Industrial Products	
Co., B. F. (Koroseal) .....	1
Goodyear Pump Co. ....	408
Goslin-Birmingham Mfg. Co. ....	280
Goulds Pumps Co. ....	80
Graham Manufacturing Co. ....	224
Graham Transmissions, Inc. ....	277
Graver Tank & Mfg. Co. ....	85
Grinnell Company .....	171

Hardinge Company, Inc. ....	394
Haveg Industries, Inc. ....	339
Haynes Stellite Co., Div. of	
Union Carbide Corp. ....	217
Hercules Powder Co. ....	373
Heyl & Patterson Co. ....	82, 244
Highside Chemicals, Inc. ....	271
Hills-McCanna Co.	
Pump Division .....	306
Valve Division .....	307
Hoke, Inc. ....	264
Hooker Chemical Corp. ....	331
Hough Co., Frank G. ....	32

Illinois Water Treatment Co. ....	392
International Business	
Machines Corp. ....	6-7
Industrial Filter Pump & Mfg.	
Co. ....	154
Ingersoll-Rand .....	250
I-T-E Circuit Breaker Co. ....	403

Jamesbury Corp. ....	229
Jeffrey Mfg. Co. ....	144



What makes one  
mixer perform  
better, last longer  
than another?

☐

Better bearings to support all mixer drive shafts?

☐

Precision ground gearing in the drive?

☐

Bearing sizes and capacities that insure service life equal to all other drive components?

☐

Shafts sturdy enough to keep deflection at any point within tolerable limits?

☐

Reducer housing construction sturdy enough to permit proper operation of shafts and gears?

☐

Optimum bearing spans, based upon considerations of bearing loads and tolerable shaft deflections?

If you checked all the boxes . . . you're right! Maximum mixer life and freedom from operating troubles can be assured only through completely integrated design. In Philadelphia Mixers, this means designing from the ground up so that all mixer components have uniform performance life. It means eliminating design compromises, adaptations and short-cuts which give trouble a place to start.

Philadelphia integrated design is your guarantee that all components are of highest quality. Drive assemblies are designed to make optimum use of the quality and capacity of all components.

Result: Philadelphia Mixers perform better, last longer. This applies to both mixer drives and other components. For instance: Mechanical

seals or stuffing boxes operate under the best possible conditions because agitator shafting runs under the best possible conditions.

Six standard models, 1 to 200 HP. Special units to 500 HP. Horizontal or vertical motor drive. Mechanical seal or packed stuffing box. Paddle or turbine type impellers. Write for Catalog, A-19.

## philadelphia mixers

PHILADELPHIA GEAR CORPORATION

Erie Avenue and G Street • Philadelphia 34, Pennsylvania

Offices in all Principal Cities • Virginia Gear & Machine Corp., Lynchburg, Va.

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

CHEMICAL ENGINEERING—November 16, 1959

Jenkins Bros. ....	62
Jerguson Gage & Valve Co.....	360
Jessop Steel Co. ....	137
Johns-Manville	
(Celite) .....	37
(Packings) .....	149

Kaiser Aluminum & Chemical Sales, Inc.	
Kaiser Chemical Div. ....	239
Kennedy Van Saun Mfg. & Engrg. Co. ....	103
Kennametal, Inc. ....	279
Kidde & Co., Walter ....	258
Komline-Sanderson Engineering Corp. ....	295

LaBour Company .....	397
Lapp Insulator Co.	
Process Equipment Div. ....	99
Linde Company, Div. of	
Union Carbide Corp. ....	139
Link-Belt Co. ....	215
Liquidometer Corp. ....	231
Ludlow Saylor Wire Cloth Co. ....	227
Lukens Steel Co. ....	79

Magnetrol, Inc.	320
Manning & Lewis Engineering Co.	366
Manton-Gaulin Mfg. Co.	319
Marindus Company, Inc., The	194
Marlco Company, The	267
Mark & Co. Clayton	132
McGraw-Hill Book Co.	313
Merck & Co.	313
Metal Cladding, Inc.	326
Metal Hydride, Inc.	119
Metal Textile Corp.	276
Metal & Thermit Corp.	246
Metals & Controls, A Division of Texas Instruments, Inc.	395
Minneapolis-Honeywell	299, 395
Morehouse-Cowles, Inc.	381
Morris Machine Works	84
Multi-Metal Wire Cloth Co.	308
Murray Mfg. Co. D. J.	266

Nash Engineering Co. ....	58
National Carbon Co., Div. of Union Carbide Corp. ....	164
National Conveyors Company, Inc. ....	160
National Engineering Co. ....	342-343
National Filter Media Corp. ....	233
NETCO Corporation ....	105
New York Air Brake Co. The. ....	64
Nichols Engineering & Research Corp. ....	378
North American Philips Co. ....	18-19
Norton Company ....	46-47

**Oakite Products, Inc.** ..... 256

Pan American Sulphur Co. ....	263
Pangborn Corp. ....	322
Parks-Cramer Co. ....	279
Patterson-Kelley Co. ....	42-43
Pfaudler, Div. of Pfaudler Permutit Inc. ....	368-369
Fourth Cover	
Phelps Dodge Copper Products Corp. ....	20-21
Philadelphia Gear Corp. ....	419
Pittsburgh Corning Corp. ....	16-17
Pittsburgh Electrodryer Div., McGraw-Edison Co. ....	228
Powell Valves, Wm. Powell Co. ....	24-25
Prater Pulverizer Co. ....	350

Precision Chemical Pump Corp.	101
Premier Mill Corp. ....	309
Proctor & Schwartz, Inc. ....	371
Protectoseal Co. ....	363
Pulverizing Machinery Div., Metals Disintegrating Co., Inc.	135

Radiation Dynamics .....	329
Raybestos-Manhattan, Inc.	
Packings Division .....	268
Reid Electric & Engrg. Co. ....	145
Republic Steel Corp. ....	14-15
Resistoflex Corp. ....	357
Richardson Scal. Co. ....	270
Robbins & Myers, Inc. ....	359
Robertshaw-Fulton Controls Co.	
Fulton Controls Div. ....	342
Rochester Mfg. Co. ....	344, 345
Rockwell Mfg. Co. ....	332
Norastrom Valve .....	321
Rolock, Inc. ....	265
Roots Connorsville Blower, Div.	
of Dresser Industries, Inc. ....	143
Ross & Son Co., Inc., Chas. ....	330
Royal McBee Corp. ....	76
Ruberoid Co. ....	275
Ryerson & Son, Inc., Joseph T. ....	174

Saran Lined Pipe Co. ....	365
Sarco Company .....	60
Sargent's Sons Corp., C. G. ....	393
Scovill Manufacturing Co. ....	163
Selas Corporation of America .....	396
Sharples Corporation, The .....	302
Shriver & Company, Inc. T. ....	289
Sigmamotor, Inc. ....	370
Snap-on Tools Corp. ....	254
Southwestern Supply & Machine Works .....	261
Sparkler Mfg. Co. ....	138
Speedline Stainless Steel Fittings Div. ....	
Horace T. Potts Co. ....	407
Sperry & Co., D. R. ....	398
Sperry Products, Inc. ....	236
Spray Engineering Co. ....	240
Spraying Systems Co. ....	265
Sprout Waldron & Co. ....	422
Stokes Corp., F. J. ....	323, 328, 384
Strahman Valves, Inc. ....	349
Strong, Carlisle & Hammond, Inc. ....	142
Strong-Scott Mfg. Co. ....	315-138
Sturtevant Mill Co. ....	260
Superior Electric Co. ....	77-78
Surface Combustion Corp. (Kathabar) .....	269

Taylor & Co., W. A. ....	263
Techno Corp. ....	267
Thayer Scale Corp. ....	277
Thermal American Fused Quartz Co. ....	265
Thermo Electric Co. ....	123
Toledo Scale Div. of Toledo Scale Corp. ....	275
Tolhurst Division ....	406
Tote System, Inc. ....	335
Trane Co. ....	30-31
Tranter Mfg., Inc. Platecoil Division ....	399
Traylor Engineering & Mfg. Div. of The Fuller Co. ....	65
Tube Turns, Div. of Chemetron Corporation ....	40-41

Union Carbide Chemical Co., Div. of Union Carbide Corp. . .	111
Union Carbide Metals Co., Div. of Union Carbide Corp. . .	337
U. S. Gauge Division American Machine and Metals, Inc. . . . .	146
U. S. Industrial Chemicals Co., Div. of National Distillers & Chemicals Corp. . . . .	129-130

U. S. Naval Weapons Station.....	261
U. S. Rubber Co.....	213, 221
U. S. Stoneware Co. ....	86

Valcor Engineering Co. ....	201
Vilter Manufacturing Co. ....	274
Vogt Machine Co., Henry.....	197

Wagner Electric Corp. ....	136
Wallace & Tiernan, Inc. ....	332
Warren Pumps, Inc. ....	380
Waukesha Foundry Co. ....	297
Wedgeplug Valve Co., Div. of Stockham Valves & Fittings ..	148
Wellington Sears Co. ....	73
Western Precipitation Corp. ....	361
Western States Machine Co. ....	382
Westinghouse Electric Corp. ....	26-27
Westinghouse Electric Corp. ....	161
Williams Patent Crusher & Pulverizer Co. ....	377
W-K-M Division of ACF Industries Incorporated ....	74-75
Wolverine Tube Division of Calumet & Hecla, Inc. ....	389-390
Worcester Valve Co. ....	310-311
Wyandotte Chemicals Corp. ....	
Michigan Alkali Div. ....	12-13

Yarnall-Waring Co. . . . . 333

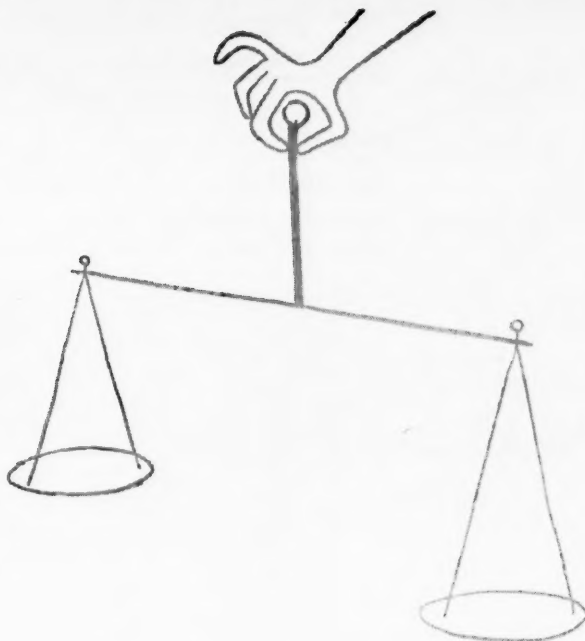
Zallea Bros. . . . . 159Professional Services ..... 408

F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES .....	409, 410
SPECIAL SERVICES .....	411
EQUIPMENT (Used or Surplus New) For Sale .....	411, 417
WANTED Equipment .....	411

Aaron Equipment Company.....	411
Allied Chemical Corp., National Aniline Div.....	409, 410
American Air Compressor Corp.....	411
Amoco Chemicals Corp.....	411
Brill Equipment Company.....	411, 413,
Chemical & Process Machinery Corp.....	412
Design & Consulting Div. of Star Tank & Filter Corp.....	411
du Pont de Nemours & Co., Inc., E. I., Equipment Clearing House, Inc.....	410, 414
First Machinery Corporation.....	415
Foxboro Company.....	410
Gelb & Sons, R.....	417
Heat & Power Company, Inc.....	414
Hercules Powder Company.....	409
Indiana-Ohio Pipe Company.....	412
Jasper Machinery Company, Inc.....	414
Kaplan Company, M. S.....	411
Lawler Company.....	411
Loeb Equipment Supply Company.....	414
Machinery Center Inc.....	412, 414
Machinery & Equipment Co. (Calif.) .....	411, 412, 414
McKee & Company, Arthur G.....	409
Monarch Personnel.....	410
Perry Equipment Corporation.....	416
Stanhope Inc., R. C.....	411
Steen Equipment Company.....	414
Sussman Inc., Louis.....	414
Thiokol Chemical Corporation.....	409
Union Standard Equipment Company.....	412

# **CHEMICAL ENGINEERS ARE DISCERNING PEOPLE**



Discernment is as much a part of the chemical engineer's tool kit as his slide rule. He's forever deciding what's of value and what's window-dressing; what works, what doesn't. And Chemical Process Industries firms bet millions each year on his technical judgment.

## **THAT'S WHY**

CHEMICAL ENGINEERING has more engineers on its publishing staff than all other Chemical Process Industries technical magazines put together.

## **THAT'S WHY**

CHEMICAL ENGINEERING's editors carefully screen and investigate each new product before reporting on it to you. This means no wasted time inquiring about old products or products that claim more than they can deliver.

## **THAT'S WHY**

We've questioned 1,000 of you every month since 1949 on your interest in our editorial material. And why we've sent personal interviewers to visit thousands of you over the years to learn what you read in CHEMICAL ENGINEERING and why.

## **THAT'S WHY**

CHEMICAL ENGINEERING furnishes a complete all-in-one-place informational service for the chemical engineer. The field's most extensive line-up of work-oriented engineering articles, feature technical reports, vital cost information, news of technology, and practical engineering departments.

## **THAT'S WHY**

In a recent magazine preference study in 29 leading Chemical Process Industry firms, CHEMICAL ENGINEERING received more than half again as many mentions as the next publication... more than 4 times as many "most helpful" votes... from men doing processing and engineering work.

## **THAT'S WHY**

CHEMICAL ENGINEERING is by far the most widely-read, most preferred magazine among chemical engineers. More engineers subscribe to Chemical Engineering than to any other magazine in its field.

# *Chemical Engineering*



McGraw-Hill Building, New York 36, N. Y.

Published every other monday for Chemical Engineers in all functions.



SPROUT-WALDRON

Pointers

for Mixing and Blending • Size Reduction  
Size Classification • Bulk Materials Handling • Pelletizing and Densifying

Published in the interest of better processing by Sprout, Waldron & Co., Inc., Muncy, Penna.

## BULK TRAILER FOR NEW JERSEY FLOUR MILLS

Delivery of a modern 1,225 cu. ft. capacity bulk body pneumatic flour handling trailer to New Jersey Flour Mills Company, Clifton, New Jersey highlights the trend to bulk handling in this industry.

The streamlined 28' bulk truck body is of single compartment construction, having seven 24"x24" inlet doors. Twin screw conveyors in the bottom of the body are driven through a positive infinite variable speed control unit. The system is self-contained and designed for efficient and economical loading and unloading at high speeds.

Lawrence F. Orbe, Jr., President of New Jersey Flour Mills Com-



28' Sprout-Waldron pneumatic bulk flour truck designed to speed local deliveries.

pany, stated that, "bulk flour is better flour; not only from the standpoint of product cleanliness and good housekeeping, but in its improved baking qualities as well; a fact proved by leading cereal chemists. Economies to the baking

industry through the use of bulk flour are also substantial. It is entirely possible that a savings of 30 to 40c/cwt. will develop through this modern method of loading out and transporting flour from mill to bakery."

SW



Adaptioneered Sprout-Waldron Horizontal Batch Mixer installed at The Dow Chemical Company, Midland, Michigan.

## NICKEL MIXER FOR THERMOPLASTICS

The mixing of thermoplastic materials and formulations at The Dow Chemical Company, Midland, Michigan, requires the use of a special Sprout-Waldron Adaptioneered horizontal batch mixer. Two unusual design requirements stand out.

In the first place, all parts in contact with the material to be processed were specified in nickel, and in the second place the mixer had to be jacketed for 30 psi liquid working pressure.

The Sprout-Waldron special horizontal batch mixer used, has a swept volume capacity of approximately 58 cu. ft. and is designed to handle a 3000# batch of material

weighing 50 lb. per cubic feet. Specifications also called for the mixer to have an extra heavy reinforced "U" trough and cover. The ASME code jacket was designed with internal baffles to prevent short circuiting and the box and cover of the unit were designed for 27" of mercury vacuum inside.

Mixing is accomplished by means of a double ribbon agitator with the end stubs set in antifriction pillow blocks.

Prior to shipment, the mixer body was tested at 30 psig with atmospheric pressure in the jacket. The jacket itself was tested at 45 psig with atmospheric pressure in the shell.

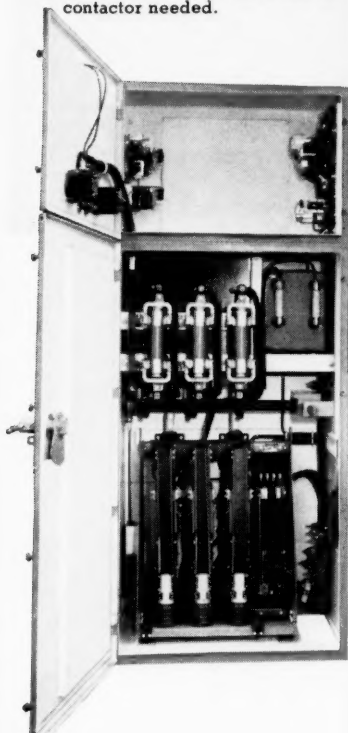
CP/110



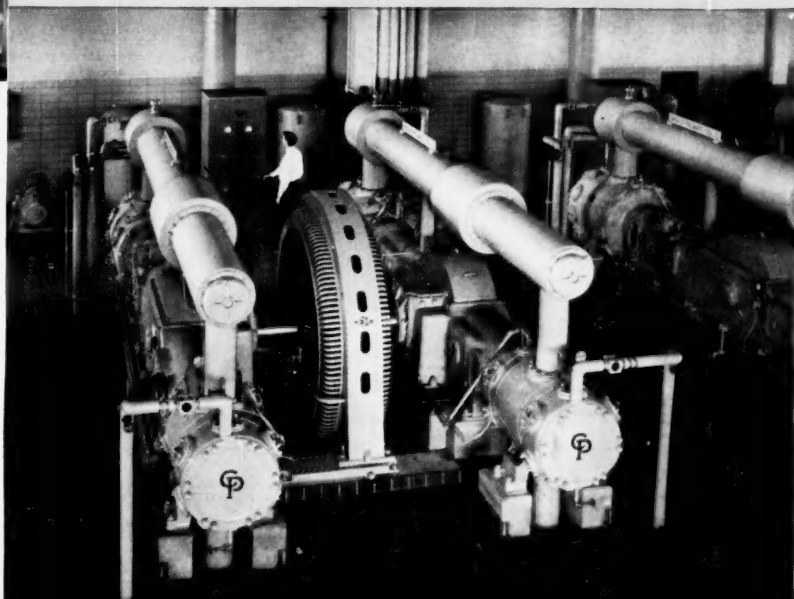


Above and at right • Four EC&M 1000 HP, 2300 Volt Synchronous Starters on air-compressor drives in Chrysler Corporation's new Ohio Stamping Plant at Twinsburg. Purchased and installed by Hatfield Electric Co., Cleveland, Ohio.

Below • Inside view of starter showing compact arrangement of fuses and contactor. The three arc shields slide out for quick access to both front and rear contacts—no draw-out of contactor needed.



## The most complete synchronous motor protection you can buy



## EC&M 2200-4800 VOLT STARTERS

• A push of the "start" button gives you complete protection during starting and running—*plus EC&M fully automatic synchronization.* Throughout the entire sequence, motor windings are completely protected and synchronization occurs at the most favorable time. Should the motor pull out of step because of voltage dip or overload, the field is automatically removed. Re-synchronization occurs when the motor re-accelerates the load. Short circuit protection is provided by current-limiting power fuses working in conjunction with EC&M's "certified" high-interrupting-capacity ZHA air-break contactor.

For complete details...

**WRITE FOR BULLETIN 8210**

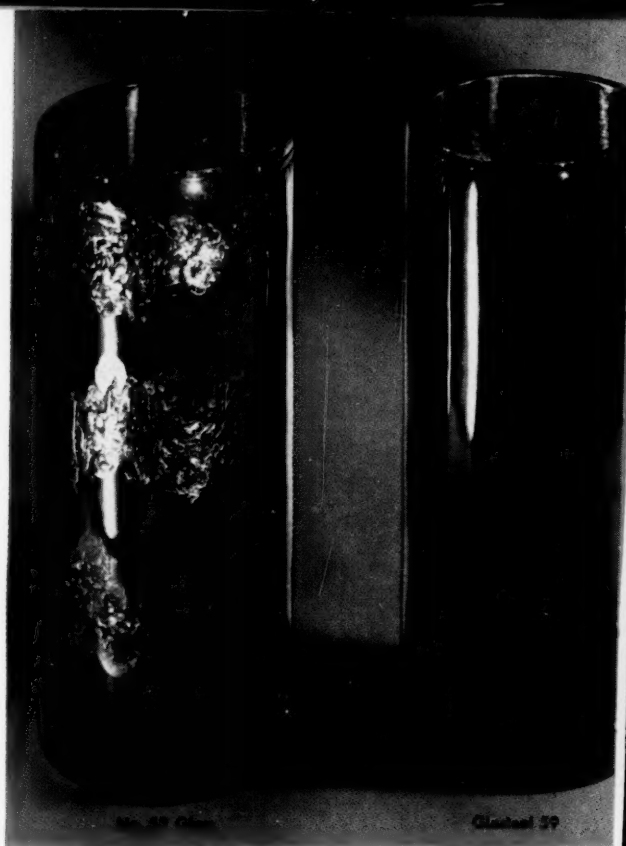


**THE ELECTRIC CONTROLLER & MFG. CO.**

A DIVISION OF THE SQUARE D COMPANY  
CLEVELAND 28 • OHIO

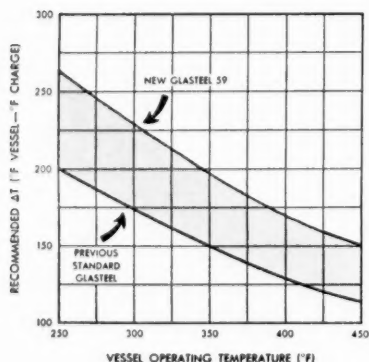
# FLUIDICS

... is a new PFAUDLER PERMUTIT program providing a modern, imaginative approach—plus the specialized materials and equipment—for handling and processing more profitably the liquids and gases which are the lifeblood of our manufacturing economy.



## FLUIDICS AT WORK

### More thermal shock data on new Glasteel 59



We glassed the outside of two 2-inch steel pipes, one with Glasteel 59 and one with the best previous material, No. 53 Glass.

Then we heated both to 525° F. and quenched them quickly in a 70° F. water bath. The picture above shows what happened. With Glasteel 59 not a bit of damage... in spite of a 455° F. instantaneous thermal shock.

In other tests we heated Glasteel 59 to 600° F. and gave it a 530° F. shock and then to 625° F. for a startling 555° F. shock. There still was no sign of cracking or crazing or other damage on the sample pipe.

Naturally we do not recommend such severe treatment for your glassed-steel equipment; but we do recommend Glasteel 59 as offering the greatest protection against thermal shock damage—a full 30% increase over our previous best grade, as shown in the chart.

In addition to improved thermal shock resistance, Glasteel 59 also gives 20% better abrasion resistance and extended service life. For more information on this new material, write to our Pfaudler Division, Dept. CEB-119, Rochester 3, New York.



Pfaudler Permutit is observing its 75th anniversary. The company has manufacturing plants in Germany (Pfaudler-Werke A.G.), Great Britain (Enamelled Metal Products Corp. Ltd.), Canada (Ideal Welding Co. Ltd.), Mexico (Arteacero-Pfaudler, S. A.), and Japan (Shinko-Pfaudler Co., Ltd.), and four plants in the U.S. Sales Offices and representatives in leading cities throughout the free world.

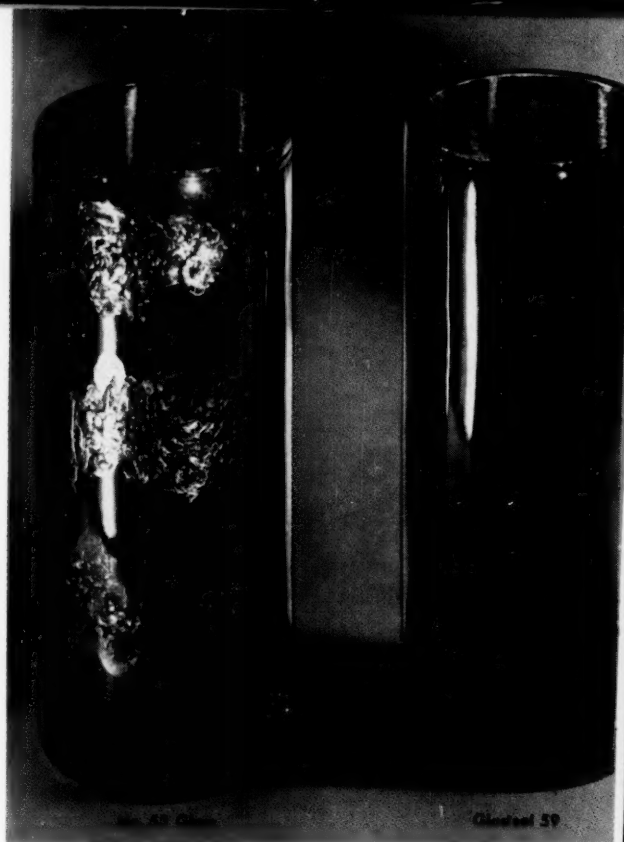
# PFAUDLER PERMUTIT INC.

SPECIALISTS IN FLUIDICS...THE SCIENCE OF FLUID PROCESSES



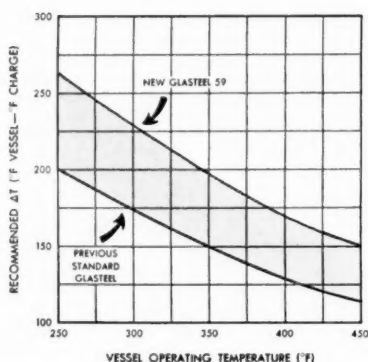
# FLUIDICS

... is a new PFAUDLER PERMUTIT program providing a modern, imaginative approach—plus the specialized materials and equipment—for handling and processing more profitably the liquids and gases which are the lifeblood of our manufacturing economy.



## FLUIDICS AT WORK

### More thermal shock data on new Glasteel 59



We glassed the outside of two 2-inch steel pipes, one with Glasteel 59 and one with the best previous material, No. 53 Glass.

Then we heated both to 525° F. and quenched them quickly in a 70° F. water bath. The picture above shows what happened. With Glasteel 59 not a bit of damage ... in spite of a 455° F. instantaneous thermal shock.

In other tests we heated Glasteel 59 to 600° F. and gave it a 530° F. shock and then to 625° F. for a startling 555° F. shock. There still was no sign of cracking or crazing or other damage on the sample pipe.

Naturally we do not recommend such severe treatment for your glassed-steel equipment; but we do recommend Glasteel 59 as offering the greatest protection against thermal shock damage—a full 30% increase over our previous best grade, as shown in the chart.

In addition to improved thermal shock resistance, Glasteel 59 also gives 20% better abrasion resistance and extended service life. For more information on this new material, write to our Pfaudler Division, Dept. CEB-119, Rochester 3, New York.



Pfaudler Permutit is observing its 75th anniversary. The company has manufacturing plants in Germany (Pfaudler-Werke A.G.), Great Britain (Enamelled Metal Products Corp. Ltd.), Canada (Ideal Welding Co. Ltd.), Mexico (Arteacero-Pfaudler, S. A.), and Japan (Shinko-Pfaudler Co., Ltd.), and four plants in the U.S. Sales Offices and representatives in leading cities throughout the free world.

# PFAUDLER PERMUTIT INC.

SPECIALISTS IN FLUIDICS...THE SCIENCE OF FLUID PROCESSES



